

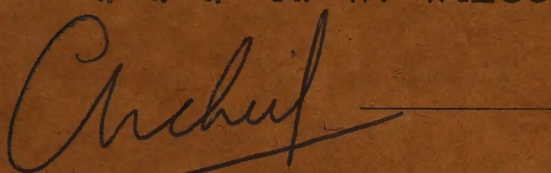
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A. V. DUTHIE: Contribution to our Knowledge of the Stellenbosch Flora. The Species of Anthericum and Chilorophytum of the Stellenbosch Flats.

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CONTRIBUTION TO OUR KNOWLEDGE OF THE STELLENBOSCH FLORA.

THE SPECIES OF ANTHERICUM & CHLOROPHYTUM OF THE STELLENBOSCH FLATS.

BY

A. V. DUTHIE.

The genera *Anthericum* and *Chlorophytum* belonging to the family Liliaceae are very closely related, the chief differences recognised being that the capsule of *Anthericum* is obtusely angled and the seeds are triquetrous, while the capsule of *Chlorophytum* is acutely angled and the seeds are compressed. The perianth of *Anthericum* is usually deciduous, while that of *Chlorophytum* tends to persist even in the mature fruit. Plants occur in which the fruit and seed characters appear to be intermediate between those mentioned, and it is possible that when the genera are critically revised *Chlorophytum* will be reduced to the rank of a sub-genus. In Baker's work, published in *Flora Capensis*, Vol. VI., there are several contradictions; for example the fruit of *A. Schultesii* is described as being "globose-triquetrous," whereas the mature capsule is sharply angled and the seeds are flattened. Again, below the description of *A. triflorum*, Baker quotes *Anthericum bipedunculatum*, Jacq. Ic. II. t. 410; but Jacquin's plate clearly shows an acutely three-angled capsule and flattened seed. If the two genera are to be maintained, then both these species should be placed in *Chlorophytum*. It is generally admitted that the work on the South African Monocotyledons requires thorough revision and this is specially true of the genera under discussion. Much of the material handled by the earlier systematists was very imperfect, the few specimens available for study gave little idea

of the variations often to be encountered within the limits of a single species, while the underground parts and the mature fruits and seeds were frequently wanting. In the circumstances it is not surprising that some of the specific descriptions are incomplete, that distinct species have occasionally been included under one specific name, and that forms of a single plant may have been described as independent species. If the attempt to revise these genera is to meet with success living material must be studied wherever possible, and a large range of plants belonging to each species must be available for examination. The writer will be very grateful for rooted specimens from all parts of South Africa. Carefully collected and dried material with habit and habitat notes will also be of great value, and the cost of postage will gladly be refunded.

The genera *Anthericum* and *Chlorophytum* are well represented on the Stellenbosch Flats where no fewer than thirteen species occur, some of them in great abundance. The detailed descriptions, which will be given later, are based upon the examination of large quantities of fresh material. The work has been hampered to some extent by lack of access to some of the literature and earlier type specimens; but the library and specimens of the Bolus Herbarium have very kindly been placed at my disposal by the Curator, and the dried plants in other Peninsula Herbaria have also been consulted. My thanks are due to Mr. L. Verwoerd for the photographs reproduced in this paper.

Two of the Stellenbosch Flats' species, *A. triflorum* and *A. longifolium*, belong strictly to the hillside and mountain flora. The former has only been found on the further terrace of the Eerste River, not far from the Strand Road. The latter occurs abundantly on the low spur of Papegaaaisberg near the railway bridge, and between the Strand Roads and Libertas, and at these points only reaches the flats' level. *A. Schultesii*, another hillside species, extends to the foot of the First River Terrace, above the golf course. *A. hirsutum*, *A. brachypodium*, *A. chlamydophyllum* and *A. hispidum* are frequent in well-drained sandy and stony places. *A. elongatum*, the most abundant and wide-spread of all the flats' species, is characteristic of the more clayey areas, and the less frequent, later-flowering

C. tuberculatum is found in similar situations. *A. scariosum* has only been found on low-lying, gravelly soil, while *A. longipedunculatum* occurs in abundance in wet hollows and *A. scabrum* inhabits seasonal swamps. Though juvenile plants of several distinct species may appear somewhat similar no indication of hybridisation has been met with.

The vegetative and floral features of the local species will now be summarised, special reference being made to characters which have been found to be of systematic value.

The adult root-system is usually very definite for each species and several well-marked types occur. In *A. Schultesii* the roots are usually unthickened and arise from a slender rhizome. (Pl. VI., Fig. 1.) In the majority of the local species some or all of the roots are thickened, serving as storage organs. The thickening may be confined to the root apex as in *A. scariosum* or the greater part or the whole of the root may be enlarged. The growing points of old roots which have ceased to act as storage organs often give rise to delicate thread-like root-fibres. The root-systems of *A. hispidum*, *A. longipedunculatum*, and *A. Pappi* are very similar (Pl. I., Figs. 2, 3, 8). The elongated root tubers of *A. brachypodum* and *A. chlamydo-phyllum* are whitish in colour and closely crowded on the rhizome (Pl. I., Fig. 5). Those of *A. scabrum* are more solid in texture and of an orange-yellow colour. One of the most striking root-systems is that characteristic of the adult plants of *A. elongatum* in which the cylindrical roots arise from a vertical rhizome and spread horizontally (Pl. III., Figs. 1, 9). Juvenile plants, however, do not show this character (Pl. I., Fig. 7). In *C. tuberculatum* the very short, swollen roots give a characteristically tuberculate appearance to the rhizome (Pl. VII., Fig. 1).

Vegetative reproduction may result from the branching of the thick or thin rhizome or, in *A. elongatum*, occasionally from root buds.

Rudimentary leaves are often present on the rhizome and the character of these may be of value in distinguishing species. In *A. hirsutum* they are flat and membranous and occur both at the base of the leaf clusters and also between the foliage leaves (Pl. II., Fig. 1). In *A. elongatum*, *A. longipedunculatum* and *A. Pappi* the outer reduced leaves surround the group of foliage

leaves and inflorescences like an involucre (Pl. III., Fig. 9). In *A. chlamydophyllum* and *A. scabrum* the base of each separate foliage leaf is invested with a distinct membranous sheath (Pl. IV., Fig. 3).

The external morphology of the foliage leaves is of considerable systematic value but must be used with caution as colour, size, form and pubescence may vary greatly in different individuals. In some species the leaf anatomy has been found of systematic value, more especially the amount and distribution of chlorenchyma and aqueous tissue and the quantity of sclerenchyma associated with the vascular bundles. When the leaf is broken across, the spiral thickenings of the xylem vessels often separate from the walls and form delicate, gossamer-like threads. This is very striking in *A. hirsutum*, but occurs to a less extent in several other species.

The general characters of the inflorescence and bracts are as a rule constant for each species. Details of these will be found in the descriptions which follow.

Certain features in the morphology of the flower are worthy of special mention. In three of the flats' species—*A. scabrum*, *A. elongatum* and *A. Pappei*—there are two conspicuous yellow dots near the base of each perianth lobe, one to the right and the other to the left of the central keel. These dots are paler in green-keeled than in brown-keeled flowers. The filaments, with the exception of those of *A. scariosum*, are more or less conspicuously muricate. The filament may be of approximately the same diameter throughout or the base may be flattened and ciliate. This enlargement of the lower part of the filament is most conspicuous in *A. scabrum* where the flattened and fringed bases of the three antipetalous stamens form a cup about the ovary, thus protecting the honey which escapes from the septal glands. In this species there is a smooth yellow zone to the filament immediately above the dilated base. *A. elongatum* and *A. Pappei* show the same flattening and fringing of the bases of the filaments, though to a less extent. In these three species the inner filaments tend to curve outwards just above the flattened base in striking contrast to the filiform stamens of species such as *A. hispidum*, which remain erect or sub-erect even in the fully opened flower.

The style is smooth in all species examined. Baker's statement, that in the subgenera *Dilanthos* and *Trachyandra* both filaments and style are "scabrous with raised points," was apparently made in error.

It is unfortunate that in so many of the type specimens of *Anthericum* mature capsules and seeds are not represented for it is precisely these organs which appear to be of greatest systematical value. In addition to striking differences in the size and shape of the ripe fruits, the appearance and behaviour of the pedicels after pollination differ markedly in the different species.

The flowers of most of the species of *Anthericum* studied open about midday and remain open during the afternoon; those of *Chlorophytum tuberculatum*, on the other hand, are open for the greater part of the day. In addition to the conspicuousness of the corolla and the copious secretion of honey from the septal glands, several species of *Anthericum* have a pronounced odour. The scent may be very sweet, as in *A. hispidum* and *A. brachypodum*, or heavy and musk-like as in *A. scabrum* and *A. elongatum*. Bees are the chief pollinating insects and most of the species fruit freely.

The leaves of *A. hispidum* and *A. longipedunculatum* are occasionally infected with *Puccinia polycampta*.

KEY TO STELLENBOSCH FLATS' SPECIES.

(The months of flowering are indicated by numerals placed after each species.)

- I. *Capsule more or less globose or obtusely angled, beakless; seeds triquetrous.*

- (a) *Leaves of adult plant flat, linear or ensiform, $\frac{1}{2}$ — $2\frac{1}{2}$ cm. wide.*

Leaves delicate in texture, glabrous or hispid; raceme simple, often dense; pedicels hispid, looping back after pollination.

1. *A. hispidum* 7—8

Leaves distichous, conduplicate below, softly hairy; inflorescence simple or branched, overtopping the leaves; fruiting pedicels glabrous, usually curving inwards.

2. *A. hirsutum* 9—10

Leaves finely ribbed longitudinally, scabrid mainly along margins.

3. *A. longifolium* 9—10

(b) *Leaves, terete or sub-terete* (occasionally narrow-linear in *A. elongatum*), 2—5 mm. wide.

Leaves glabrous, rigid in texture, sclerotic, with thickened margins, sheathing at base.

4. *A. brachypodum* 10—4

Leaves rather delicate in texture, 1—5 mm. wide, more or less flattened above, usually with a few sparse, bristle-like hairs along margins; roots spreading horizontally.

5. *A. elongatum* 7—9

Leaves terete, 1—2 mm. wide, glabrous, often mottled towards base; raceme very lax, pedicels 13—28 mm. long.

6. *A. longipedunculatum* ... 8—10

Leaves 1—2 mm. wide, straight or flexuose, closely veined longitudinally, flat or channelled above; surface scabrid with very short hairs.

7. *A. Pappei* 9—10

Leaves, terete or sub-terete, glabrous, each surrounded at base with a close membranous sheath; infl. simple, knee-bent.

8. *A. chlamydophyllum* 8—11

Leaves $1\frac{1}{2}$ — $2\frac{1}{2}$ mm. wide, flat or slightly channelled above, surface often minutely scabrid; leaf-base surrounded with a close, membranous sheath; infl. dichotomously branched.

9. *A. scabrum* 8—11

11. *Capsule beaked.*

Rhizome thickly clothed with fibrous remains of old leaves; roots wiry, tuberous at the apex; leaves narrow-linear, channelled, with minutely cartilagino-dentate margin.

10. *A. scariosum* 1—3

III. *Capsule acutely angled, seeds flattened.*

Rhizome slender; roots usually unthickened; leaves rather rigid in texture, more or less distichous; perianth lobes keeled with gold-brown.

11. *A. Schultesii* 9—11

Roots usually fleshy, leaves rather thin in texture, not distichous, margins often undulate.

12. *A. triflorum* 9

Rhizome short, thick, covered with tubercle-like roots; perianth usually flushed with reddish-purple.

13. *Chlorophytum tuberculatum* 8—10

1. *Anthericum hispidum*, Linn.; root-fibres thick and fleshy, outer rudimentary leaves whitish, membranous, forming a sheath about the base of the plant; foliage leaves 2—5 or more, linear, 6—45 cm. long, 2—10 mm. broad, straight or more or less spirally twisted, delicate in texture, glabrous or hispid, often margined with purple; peduncles, 1 or more to a plant, more or less hispid, 2—28 cm. long; raceme usually very dense,

simple, $2\frac{1}{2}$ —7 cm. long; bracts large, lanceolate-deltoid, about 15 mm. long, membranous, whitish in colour, hispid especially along the margin; pedicels slender, hispid, the lower 19—30 mm. long, recurved after pollination; perianth hispid, about 1 cm. long, segments white with a flesh-pink tinge, conspicuously keeled with brown, inner broader than the outer, claw of inner segment minutely papillate along margin; stamens shorter than the perianth, filaments filiform, pale flesh coloured, inner more markedly muricate than outer and ciliate at base; anthers yellow, much shorter than filaments; ovary globose, green, about 1 mm. in diam.; style slender, 5—8 mm. long, smooth; stigma papillate; capsule smooth, more or less pyriform; seeds about 2 mm. diam.

Stellenbosch Flats, in sandy soil, locally frequent. July to August.

This species is really recognised by the simple, usually compact raceme, conspicuous bracts and hispid pedicels which loop back after pollination. The foliage leaves vary greatly in size and pubescence and are often entirely glabrous. The purple margin, when present, is due to the presence of a reddish sap in the epidermal cells. The leaf is always slightly fleshy and delicate in texture. With the exception of the two marginal bundles, which are protected by arcs of sclerenchyma, the leaf is devoid of sclerotic tissue. As in most species examined, the spiral thickenings of the vessels draw out into gossamer threads when the leaf is broken across. The flowers are sweet-scented. The leaves are often attacked by a rust-fungus, *Puccinia poly-campta*, Syd.

2. *Anthericum hirsutum*, Thunb.; rhizome short, rather woody; roots slender, wiry; old leaves not breaking up into bristles; rudimentary leaves broad, membranous, the outer encircling the group of foliage leaves; foliage leaves firm in texture, dark green, broadly linear, conduplicate below, flat or with a slight spiral twist, 7—25 cm. or more long, $\frac{1}{2}$ —2 cm. broad, more or less distichous, forming a close, fan-like rosette; surface of lamina softly hairy, sometimes glabrescent above, foliage leaves alternating with membranous, truncated, reduced leaves; peduncle pubescent below, often glabrous above, unbranched or branched, 30—40 cm. long; racemes 1—6, lax, 27—80 fld.;

bracts minute, deltoid-cuspidate, membranous, ciliate, downy, 1—4 mm. long; pedicels solitary, sub-erect, the lower 3—7 mm. long, articulated at the apex, often curving inwards when fruiting; perianth 10—12 mm. long; segments white with a distinct reddish-brown or green keel, the inner about half as broad again as the outer; stamens shorter than the perianth, filaments sub-equal, minutely muricated, narrowing gradually towards base; ovary globose; style glabrous, filiform; stigma minutely papillate; capsule sub-globose, 4—5 mm. diam.; seeds tetrahedral, minutely tubercled, 2—3 mm. diam.

Stellenbosch Flats, in sandy soil, locally frequent; September—October.

This species is easily recognised by its robust habit and distichous rosettes of softly hairy, sword-like leaves.

3. *Anthericum longifolium*, Jacq.; rhizome short, vertical; roots long and slender, cylindrical, spreading horizontally; rudimentary leaves membranous, the inner closely investing the bases of the foliage leaves; foliage leaves linear, flat, firm in texture, up to 20 cm. or more long, $\frac{1}{2}$ — $3\frac{1}{2}$ cm. wide, muricated especially towards margins, surface dark green, closely ribbed longitudinally; peduncle pubescent below, glabrous above, often rather massive, sometimes $\frac{1}{2}$ cm. wide at base, profusely branched dichotomously; no. of racemes 6—40; bracts membranous, rather small, deltoid-acuminate, tapering abruptly to apex, about 3 mm. wide below, 4—6 mm. long; pedicels 10—12 mm. long, articulated at apex; perianth lobes equal, 9—10 mm. long, 2—3 mm. wide, often tinged below with flesh pink, prominently keeled with brown or green, spreading and somewhat recurved when fully open; each with 2 yellow dots at base; filaments muricate above and with yellow band between base and muricated upper portion, the inner conspicuously flattened and ciliate below; ovary sub-globose, greenish or brownish in colour, 1— $1\frac{1}{2}$ mm. long; style about 5 mm. long; capsule glabrous, sub-globose or oblong, 3 mm. diam., often about twice as long as broad; seeds black, tetrahedral, 1 mm. diam.

Stellenbosch Flats, base of Papegaaiberg near railway bridge, and between Strand Road and Libertas; end of September—October.

The inflorescence, floral and fruit characters of this species resemble those of *A. scabrum* somewhat closely, but the habitat, root system and leaves are very different.

4. *Anthericum brachypodum*, Baker; rhizome horizontal, stout, unbranched or compactly branched; roots very closely crowded, whitish, somewhat fleshy, 4—5 mm. diam. above, tapering gradually below to a slender, cord-like, branched or unbranched apex; foliage leaves often a dozen or more in a tuft, linear, glabrous, sclerotic, with thickened margins, straight or occasionally with a spiral twist, 2—4 mm. wide, 28—44 cm. long, broadening below into a membrane-edged sheathing base; reduced leaves at base of group of foliage leaves few in number, more or less membranous; peduncle slender, erect, glabrous, terete, simple or laxly branched, overtopping the leaves; racemes 8—70 or more fld.; bracts minute, deltoid-cuspidate, shorter than the pedicels; pedicels solitary, erecto-patent, 3—4 mm. long, articulated at the apex; perianth 8—10 mm. long, white, keeled with brown or greenish-brown, inner lobes broader than outer; stamens sub-equal; filaments filiform, about 7 mm. long, and $\frac{1}{2}$ mm. broad, muricated; anther 1— $1\frac{1}{2}$ mm. long; ovary globose, about 1 mm. diam; style filiform, 6—8 mm. long; capsule globose, 3—5 mm. diam.; seeds angled, $1\frac{1}{2}$ —2 mm. diam.; testa blackish.

Stellenbosch Flats, sandy and stony places, locally frequent; flowering October—April.

The type specimen of *Anthericum brachypodum* consulted (Herb. Bol. No. 3921), consists of a single plant collected by Dr. Bolus, October 1880, in sand-dunes near Rondebosch, below 100 ft. This type specimen agrees closely with the Stellenbosch plant, but differs from it in the more slender roots. Another specimen in the Bolus Herbarium, No. 2577, ex. herb. Wolley Dod, "forma ramosa," collected in November, 1897, agrees exactly with the Stellenbosch plant.

This species is very frequent in favourable localities. The close branching of the rhizome often results in the development of several distinct and crowded leaf-clusters belonging to a single plant. The leaves may persist for months after fruiting. The sheathing bases of the inner leaves are often entire, but the outer are split and may reach a breadth of from $1\frac{1}{2}$ —2 cm. The

inflorescence, which may be more than three times the length of the foliage leaves, is often profusely branched; the few simple racemes found appear to be the result of reduction.

5. *Anthericum elongatum*, Willd; rhizome short, vertical; roots of adult plants pale yellow or whitish in colour, cylindrical, 2—5 mm. in diam., unbranched or branched, spreading horizontally; outer rudimentary leaves membranous, pale yellow or whitish, forming a sub-entire sheath about the base of the plant; foliage leaves 3—15, erect or spreading, 5—30 cm. long, 1—4 mm. wide, flat or somewhat channelled above, not broadening at the base, rather delicate in texture, occasionally entirely glabrous but usually with distant, spreading or downward-directed, bristle-like hairs along the margin; peduncle one or more to a plant, 5—30 cm. long, 1—3 mm. diam. at base, glabrous or minutely scabrid, unbranched or with 2—7 branches; raceme 3—30 fld.; bracts membranous, boat-shaped, 3—11 mm. long, 2—4 mm. broad at base, usually tapering above into a long, hair-like point; lower pedicels 3—8 mm. long, erect or spreading, articulated at the apex; perianth about 10 mm. long, glabrous, segments white or flesh coloured, distinctly keeled with brown or green, each furnished at base with a pair of yellow dots, the inner almost twice as broad as the outer; scent heavy and musk-like; stamens sub-equal, inner slightly longer than outer; filaments muricated, flattened at base, bases of the inner stamens conspicuously bearded; ovary brown, cylindrical, about $1\frac{1}{2}$ mm. long and 1 mm. broad; style glabrous, 6—7 mm. long; capsule oblong, 3—6 mm. long, 1—3 mm. wide; seeds tetrahedral, about 1 mm. across, dark brown in colour, surface tuberculate.

Stellenbosch Flats, very frequent, usually in clayey soil; flowering July to September; fruiting October—November.

No. 3750, Herb. Bolus, collected August, 1877, in field near Rondebosch, agrees very closely with the Stellenbosch species described above. This specimen is quoted by Baker (Fl. Cap. VI., 389) under the name *A. elongatum*. Specimens of the Stellenbosch plant sent to Kew in 1924 were identified as *A. elongatum*, Willd.

This species is the most abundant of all the local forms. It occurs in profusion in the stiffer soils but is very rare in

sand. In favourable situations the plants are closely crowded and the horizontal roots interlace in a striking manner. Vegetative reproduction by means of root-buds sometimes occurs. The resemblance to *Ophioglossum Bergianum*, both as regards general morphology of rhizome and root system and also the vegetative reproduction by means of root-buds, is worth noting. The habitat of the two plants is similar. The leaves are sometimes undulate or show a slight spiral twist. In the green-keeled flowers, which are exceedingly rare, the yellow dots at the base of the perianth segments are very pale. In the vegetative condition this species may, as a rule, be readily recognised by the horizontal, cylindrical roots and the narrow leaves with scattered, bristle-like, marginal hairs. Juvenile plants, however, possess obliquely placed, tuberous roots and narrow leaves, which may be circular or triangular in cross section and completely devoid of hairs.

6. *Anthericum longipedunculatum*, Steud.; root-fibres mostly thick and fleshy, 2—7 mm. in diam.; outer rudimentary leaves whitish, membranous, surrounding base of plant; foliage leaves 2—8 sub-terete, somewhat channelled above, 7—40 cm. long, 1—3 mm. wide, tapering gradually to apex, rather delicate in texture, entirely glabrous or very minutely scabrid, often mottled towards base; peduncle one or few to a plant, simple or very occasionally branched, often shorter than the foliage leaves, glabrous or minutely scabrid, usually reddish-brown in colour and often finely mottled below; raceme very lax, 3—36 fld. often with a sterile bract below the lowest pedicel; bracts ovate-cuspidate, about 1 cm. long, 5—6 mm. wide at base; pedicels glabrous, articulated at apex, of lower flrs. 3—28 mm. long; perianth about 1 cm. long, lobes white with reddish-brown keels, petals broader than sepals and provided with a very minutely ciliolated claw; stamens sub-equal, muricate, shorter than the perianth; inner filaments shaggy but not markedly dilated at base; ovary 1—1½ mm. long, 1 mm. broad; style 5—5½ mm. long; capsule cylindrical, 4—7 mm. long, 2—3 mm. wide; seeds tetrahedral, about 1 mm. diam.

Stellenbosch Flats, August—October, marshy places and damp hollows, locally very abundant.

The flowers of this species are honey-scented and bee-

pollinated. The inflorescence-axis elongates greatly as the flowers open so that the fully opened raceme is very lax. The species may be readily recognised by the very narrow sub-terete leaves and long-stalked flowers. The statement (Fl. Cap., Vol. VI., p. 390) that the leaves are $\frac{1}{2}$ in. diam., is surely a misprint!

7. *Anthericum Pappi*, Baker; rootstock short, vertical, roots tuberous; rudimentary leaves whitish, forming a sheath surrounding the group of foliage leaves; foliage leaves 1—6, often rather wiry, dark green, straight or undulate, 12—26 cm. long, $\frac{1}{2}$ —2 mm. wide, closely veined longitudinally, sometimes slightly channelled above, surface rough with short scattered hairs; peduncle 7—23 cm. long, unbranched or branched, cylindrical, pubescent or almost glabrous; bracts membranous, deltoid-cuspidate; pedicels 5—9 mm. long, glabrous, articulated at the apex; perianth 1 cm. or more long, lobes white, prominently keeled with green or brownish-green and with distinct yellow or yellowish-green markings near the base; filaments of outer stamens scabrid, of inner conspicuously muricated above, flattened and shaggy below; ovary 1—2 mm. diam., brownish in colour; style glabrous, 6—10 mm. long.

Stellenbosch Flats, First and Second River Terraces, occasional, September—October.

This species is readily recognised by the narrow, longitudinally ribbed, scabrid leaves which are often flexuose, and the short, tuberous roots. It was originally collected by Pappe at Tulbagh. What appears to be the same species has been found by the author flowering abundantly on the farm Kleinberg in the Tulbagh District. The size of the specimens collected at Tulbagh varies within wide limits. The largest, growing in the shelter of *Passerina* shrubs, shows a group of over 20 roots and 6 slightly-channelled foliage leaves, some of which reach a length of nearly 60 cm. and a breadth of 4 mm. The taller of the two panicles produced is over 60 cm. long and 6-branched, while the shorter is 2-branched. Other specimens approach more closely to the Stellenbosch form, while a few resemble it in all essentials.

In the Stellenbosch District *A. Pappi* is occasional on the hill-slopes but rather rare and usually stunted on the Stellenbosch Flats. All the local specimens examined thus far have an unbranched peduncle, 20 cm. long or under, and the rather rigid, wiry leaves are straight or more or less flexuose. Several small, sterile plants bearing 1—3 leaves have been found on the golf links. The capsules of the Tulbagh plant are about 6 mm. long and the seeds are black and 1 mm. diam. The fruit and seeds of the Stellenbosch plant have not been seen. No type specimen of *A. Pappi* is available for study in any of the South African herbaria. The Stellenbosch plant agrees with the description in *Flora Capensis*, and dried specimens submitted to Kew were identified as *A. Pappi*, Baker.

The species is apparently a very variable one as regards the size of the plant as a whole and the leaf and inflorescence characters. The scabrid, finely-ribbed leaves, yellow-barred perianth segments and staminal characters appear to be constant. In the South African Museum Herbarium, specimen No. 22,918, which was collected by Zeyher at Camps Bay, agrees exactly with the Stellenbosch plant. It is labelled *A. flexifolium*, L.f. No. 22,973, collected by Pappe at Tulbagh in November, is identical both with the Stellenbosch plant and with the smaller plants collected by me at Tulbagh. On this sheet is written: "Not identified, J.G.B." In the Bolus Herbarium No. 2,331 ex. Herb. Wolley Dod, collected at Lion's Head, over 100 ft., 17th October, 1897, agrees closely with *A. Pappi* as it occurs in the Stellenbosch District. This specimen is named *A. serpentinum*, Baker.

It is obvious that there is much confusion regarding the three species *A. Pappi*, *A. flexifolium* and *A. serpentinum*, and it is possible that when the genus as a whole is revised they may be considered as forms of a single, wide-spread and variable species.

8. *Anthericum chlamydophyllum*, Baker; rhizome branched or unbranched; roots densely crowded, 4—5 mm. thick above, 5—10 or more cm. long, tapering to the apex, whitish in colour and often covered with a felt of short hairs; leaves a dozen or more in a tuft, glabrous, somewhat fleshy, terete or sub-terete, 30—70 cm. long, 3—5 mm. diam., usually erect, straight or

undulate or occasionally spirally twisted, finely striated longitudinally, each with a brown, membranous, funnel-shaped sheath of reduced leaves at base; peduncle stout, simple, glabrous, about half as long as the foliage leaves, knee-bent below and inclining outwards; raceme simple, rather compact, 7—40 fld. with 2—8 empty bracts at base; floral bracts 7—10 mm. long, 3—4 mm. wide below, minutely ciliated; pedicels glabrous, 12—35 mm. long, sub-erect, articulated at apex; perianth white or whitish, glabrous, sweet-scented, 10—13 mm. long; segments conspicuously keeled below with green or greenish-brown; inner segments slightly broader than outer; stamens sub-equal, shorter than perianth; filaments white, filiform, minutely scabrous, not flattened or shaggy at base; ovary globose, 1—1½ mm. diam.; style slender, glabrous, about five times as long as the ovary; fruiting pedicels bent sharply back; capsule sub-globose, 7—10 mm. long, 6—8 mm. broad; seeds tetrahedral, 3—5 mm. across.

Stellenbosch Flats, in sandy soil, occasional; August—November.

This species is readily recognised by the glabrous, terete or sub-terete leaves, each with a conspicuous sheath at the base, and the simple outward-bent inflorescences. The peduncle and pedicels usually thicken markedly in the fruiting stage. The capsules are among the largest met with locally. This species grows most luxuriantly in well-drained sandy soil; when it occurs in other situations it is often much stunted.

9. *Anthericum scabrum*, L.f.?; rhizome short, vertical or horizontal; roots fleshy, yellow, crowded, fusiform, tapering below into a cord-like apex; leaves erect or recurved, sometimes slightly undulate or with a spiral twist, 10—53 cm. long, 1—4½ mm. diam., firm and somewhat fleshy in texture, sub-terete, flattened or slightly channelled above, dark green in colour, closely veined longitudinally, glabrous or scabrid, especially along margins, with few or many short, scattered points; leaf-base closely surrounded by a reddish-brown sheath of reduced, membranous leaves; peduncle 2½—6 mm. thick below, glabrous, or minutely scabrid towards base, often overtopping the leaves, usually laxly and dichotomously branched; racemes 4—23; bracts small, 2—5 mm. long, 1½—3½ mm. broad, tapering to the apex; racemes 8—23 fld.; pedicels of lower flrs. 1 cm. or more long, articulated at the apex; perianth glabrous, about

1 cm. long, lobes white, recurved, keeled with brown, each with yellow markings near the base; inner perianth lobes broader than the outer; odour of flrs. heavy, musk-like; outer stamens rather shorter than inner, filaments all muricate above, barred with yellow towards base, inner flattened and conspicuously bearded below; ovary globose, about 1 mm. long; style smooth, filiform, 6—8 mm. long, minutely trifid at apex; fruiting pedicels erect or sub-erect; capsule sub-globose, about 6 mm. long and 4 mm. broad; seeds tetrahedral, $1\frac{1}{2}$ —2 mm. diam.

Stellenbosch Flats, usually in marshy ground, locally frequent. Flr. August—November, fruiting October—December. Herb. Univ. Stell., Flora Reg., Stell., 1526.

Vegetatively this species bears a superficial resemblance to *A. chlamydophyllum* but may be recognised by the crowded, fusiform, yellow roots and the sub-terete often scabrid foliage leaves. The membranous sheath at the base of each leaf is less conspicuous than that of *A. chlamydophyllum*, while the inflorescence, floral and fruit characters of the two species are very different.

This species has been named provisionally *A. scabrum* as it agrees fairly well with the description given by Linn. fil. Suppl. 202. The type specimen of *A. scabrum*, which is not available for comparison, was collected by Thunberg in sandy places between Cape Town and Hottentots Holland. Specimens of the Stellenbosch plant have been submitted to Kew and the report received is as follows: "Matches *A. scabrum*, L.f. as represented in our herbarium by Schlechter, 11376 from S.W. Africa. We have no authentic example of this species." In general habit and floral characters the local plant bears some resemblance to Jacquin's figure of *A. elongatum* var. *flexifolium*, and specimens which resemble the Stellenbosch species are among those labelled *A. elongatum* in the Bol. Herb.

10. *Anthericum scariosum*, A. Duthie*; rhizome slender, branched or unbranched, vertical or more or less horizontal, thickly clothed with the fibrous remains of old leaves; roots numerous, slender, tuberos at apex, the older wiry; outer rudimentary leaves small, somewhat membranous, hidden among

*For Latin descriptions of *Anthericum scariosum* and *Chlorophytum tuberculatum* see Annals of the Bolus Herbarium.

the old leaf fibres; foliage leaves 5—15 or more, sub-terete or channelled above, entirely glabrous or minutely cartilagino-dentate along margin, 5—17 cm. long, 1—2 mm. wide, broadening below into a membranous, sheathing base; peduncle unbranched or branched, wiry, with 1—3 much reduced leaves; bracts small, membranous; pedicels 5—10 mm. long, articulated near the base, the lower often 2-nate; perianth about 10 mm. long, lobes white, sub-equal, with a 3-nerved green or brownish-green keel; filaments smooth, longer than the anthers; ovary about 2 mm. long and 1 mm. diam.; style 6 mm. long, glabrous; capsule about 8 mm. long, clothed at base by the persistent perianth, narrowed above into a conspicuous beak; seeds black, about 2 mm. diam., irregularly tetrahedral.

Stellenbosch Flats, in gravelly soil, rare; flowering January—March; leafing May—November; Herb. Univ. Stell.; Flora Reg. Stell., 1818.

This species is readily recognised by the fibrous roots which bear tubers at the tips only, the narrow, channelled leaves and the conspicuously beaked capsules. A single fruiting specimen of this plant (2484. Flora of Cape Peninsula, ex. Herb. A. H. Wolley Dod. Rondebosch, 19th May, 1897) occurs in the Bolus Herbarium. In the Cape Town University Herbarium there are two specimens, collected by Guthrie, 21st December, 1889, which resemble the Stellenbosch plant very closely but are much larger. One of these specimens bears a single, unbranched peduncle, the other a rigid and erectly branched peduncle with 5 racemes. Dried material of the local plant, submitted to the Kew Herbarium, was found to match *A. scariosum* Schlechter No. 9884 from Zondereinde River; apparently not published by Dr. Schlechter. Schlechter's name has been retained.

The leaf anatomy was found to be very different from that of other species studied. Conspicuous masses of sclerenchyma are developed at the leaf margins and also associated with the vascular bundles. There is no distinct aqueous tissue. The epidermal walls are heavily thickened and the stomata sunken.

11. *Anthericum Schultesii*, Baker; rhizome slender, horizontal or more or less inclined, branching freely, often covered with bristle-like remains of old leaf bases; roots wiry, unbranched or

sparingly branched, very occasionally enlarged towards apex; leaves in a distichous rosette, linear, rather rigid in texture, conduplicate, 5—30 cm. long, 6—12 mm. broad, with 8—12 close, parallel veins on each side of the midrib, surface glabrous, margin usually minutely cartilagino-ciliate; peduncle 15—30 cm. long, unbranched or sparingly branched, with 1—3 rudimentary leaves below the raceme; racemes 1 or few; bracts small, broadly deltoid or deltoid-cuspidate, purple veined, more or less prominently membrane-edged; pedicels 3—10 mm. long, articulated near the base, lower often 2—3 nate; perianth 10—15 mm. long, persistent, segments white with a 3-nerved, golden-brown keel, in smaller flowers sub-equal, in large flowers inner segments often twice as long as outer; stamens slightly shorter than the perianth, filaments filiform, scabrid above, much exceeding the oblong anthers; ovary 3-lobed, 3—4 mm. long; style slender, glabrous, about twice as long as the ovary; capsule acutely 3-angled; seeds flattened about 3 mm. across, with black, crustaceous testa.

Stellenbosch Flats, First River Terrace, rare; September—November.

12. *Anthericum triflorum*, Ait.; rhizome unbranched or sparingly branched, bearing bristly remains of old leaves; roots clustered, cylindrical or tuberous, the older often with slender, fibrous branches; leaves about 8—10, rather thin in texture, 5—8 mm. wide, surface glabrous, usually somewhat undulate towards margin and minutely ciliate, with 6—10 nerves on each side of mid-rib; peduncle unbranched or branched, with 2—3 rudimentary leaves; bracts membranous, veined with purplish-brown; pedicels about 1 cm. long, articulated near the middle, the lower sometimes 2—3 nate; perianth white, sometimes slightly flushed with purple below; segments oblanceolate, somewhat boat-shaped, with a prominent, closely-nerved brownish keel; inner segments slightly broader than the outer; stamens somewhat shorter than the perianth; filaments filiform, minutely scabrous, about twice as long as the oblong, yellow anthers; ovary green, oblong, 3—4 mm. long, acutely angled; style declinate, about twice as long as the ovary; stigma minutely papillate.

Stellenbosch Flats, near Strand Road, September.

The Stellenbosch plant has not been found in fruit, but fruits of specimens collected in the Tulbagh District were acutely angled and the seeds were flattened.

13. *Chlorophytum tuberculatum*, A. Duthie; rhizome short, stout, unbranched or branched, vertical or more or less horizontal, closely covered with short, swollen, tubercle-like roots, rough with bristly remains of old leaves; roots short and thickened, 2—4 mm. long or slender and elongated, reaching length of 4 cm. or more; leaves up to 6 or more in a cluster, erect or spreading, linear, conduplicate, sheathing at base, 7—15 cm. long, 2—4 mm. wide, rather rigid and thin in texture, closely veined longitudinally, surface glabrous, margin very minutely cartilagino-dentate; peduncle unbranched, including the inflorescence 10—25 cm. long; raceme 1—8 flrd., often with a single, empty, membranous or leaf-like bract at base; fertile bracts deltoid-cuspidate, about 10 mm. long and 5 mm. broad below, membranous, reddish in colour with 3—5 darker brown nerves, the lowest occasionally 2-flrd.; pedicels erect or sub-erect, of lower flrs. 3—10 mm. long, generally articulated near the middle, the lowest occasionally 2-nate; flrs. large, handsome, 2 cm. or more across, perianth segments sub-equal, persistent, white, conspicuously keeled with gold-brown, the outer slightly narrower than the inner, reddish below; stamens sub-equal, filaments about 7 mm. long, under 1 mm. wide at the middle, tapering to base and apex, minutely scabrid, many times longer than the small, yellow anthers; ovary bright green, 3-angled, $2\frac{1}{2}$ —4 mm. long, $1\frac{1}{2}$ —2 mm. diam.; style white, slender, glabrous, about 6 mm. long; stigma minutely papillate; capsule acutely angled, 7—9 mm. long, 6—7 mm. diam., transversely veined, partly hidden by the persistent perianth; seeds flattened, 2—3 mm. broad, testa black, crustaceous; no. of seeds matured in a capsule 3—15.

Stellenbosch Flats, First and Second River Terraces, in clayey soil, locally frequent; flowering August—October. Herb. Univ. Stell., Flora Reg., Stell., 992.

This species is readily recognised by the tuberculate, bristly rhizome, the conduplicate, linear leaves and the showy flowers. The short, swollen roots serve first as storage organs and later may give rise at the apex to delicate, hair-like, absorbing roots. In addition to these the rhizome bears a number of elongated, cylindrical roots which serve to anchor the plant in the soil. The flowers have no appreciable odour. While the outer perianth

lobes are generally flushed below with reddish-purple*, specimens are occasionally found in which the sepals are keeled with green.

Pappe's specimens, Hb. Gub. C.B. Spei, collected at Tulbagh in November, belong to this species. No. 4051, Worcester, ex Herb. Wolley Dod, Hex River Valley, Aug. 12, 1897, also seems identical with the Stellenbosch plant. The writer has found this species on the farm Kleinberg in the Tulbagh District growing on weathered clay slates.

*Colour on under side of bracts and perianth, taken with Ridgway's Colour Guide, lighter parts Pomegranate Purple, darker parts Bordeaux.

EXPLANATION OF ILLUSTRATIONS.

PLATE I.

- Fig. 1. *A. longipedunculatum*, root system of young plant.
- Figs. 2—3. *A. longipedunculatum*, root system of adult plant.
- Fig. 4. *A. scabrum*, young plant.
- Fig. 5. *A. brachypodum*, base of adult plant.
- Fig. 6. *A. Pappei*, young plant.
- Fig. 7. *A. elongatum*, young plant.
- Fig. 8. *A. Pappei*, base of adult plant.

PLATE II.

- Fig. 1. *A. hirsutum*, rudimentary leaves.
- Fig. 2. *A. chlamydophyllum*, trans. sect. of leaf.
- Fig. 3. *A. hispidum*, trans. sect. of leaf.
- Fig. 4. *A. brachypodum*, trans. sect. of leaf.
- Fig. 5. *A. brachypodum*, base of leaf.
- Fig. 6. *A. longifolium*, part of trans. sect. of leaf.
- Fig. 7. *A. hispidum*, stamens.
- Fig. 8. *A. hispidum*, fruiting pedicel.
- Fig. 9. *A. longifolium*, fruit.
- Fig. 10. *A. hirsutum*, fruit.
- Fig. 11. *A. chlamydophyllum*, fruit.

PLATE III. FIGS. 1—11. *A. ELONGATUM*.

- Fig. 1. Adult plants in fruit.
- Fig. 2. Bract.
- Fig. 3. Inner stamen.
- Fig. 4. Outer stamen.
- Fig. 5. Pistil.
- Fig. 6. Upper part of filament of inner stamen.
- Fig. 7. Base of filament of inner stamen.
- Fig. 8. Apex of style and stigma.
- Fig. 9. Root system of adult plant.
- Fig. 10. Capsule, dehiscent.
- Fig. 11. Seeds.
- Fig. 12. Root-bud.

PLATE IV. FIGS. 1—8. *A. SCABRUM*.

- Fig. 1. Adult plant with young fruit.
- Fig. 2. Flat, rudimentary leaves.
- Fig. 3. Base of foliage leaf with close, membranous sheath.
- Fig. 4. Perianth flattened to show shape and markings of lobes.
- Fig. 5. Outer stamen.
- Fig. 6. Inner stamen.
- Fig. 7. Pistil.
- Fig. 8. Capsules and seeds.

PLATE V. FIGS. 1—7. *A. SCARIOSUM*.

- Fig. 1. Adult plant with leaves and weathered fruit of preceding season.

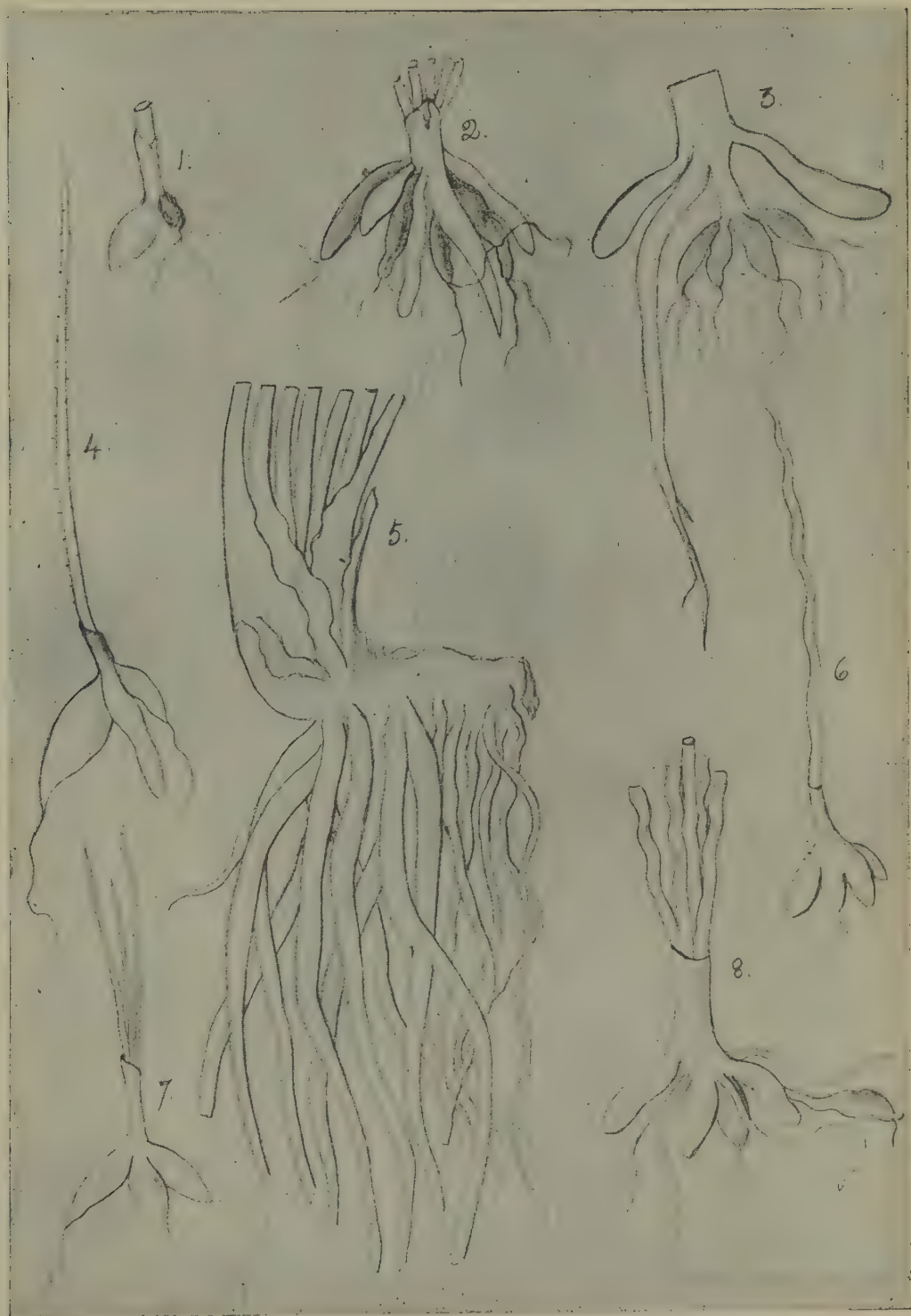
- Fig. 2. Capsules.
- Fig. 3. Seeds.
- Fig. 4. Stamen.
- Fig. 5. Pistil.
- Fig. 6. Trans. sect. of leaf.
- Fig. 7. Part of trans. sect. through epidermis.

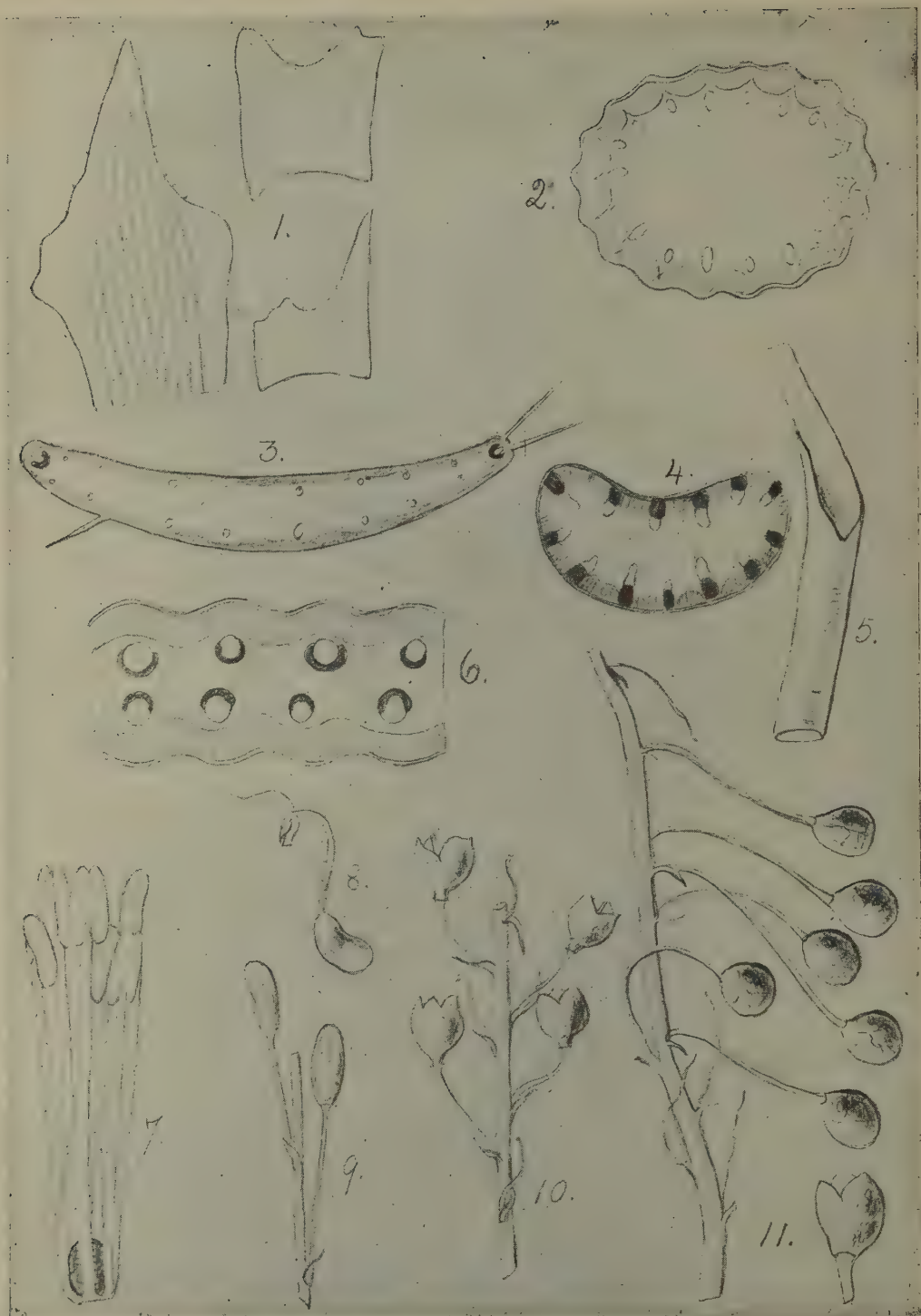
PLATE VI. FIGS. 1—8. *A. SCHULTESII*.

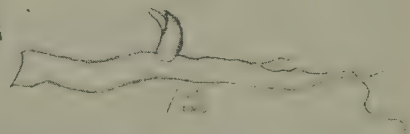
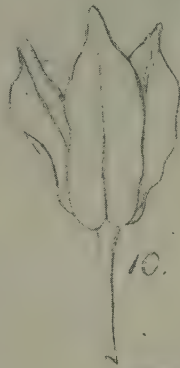
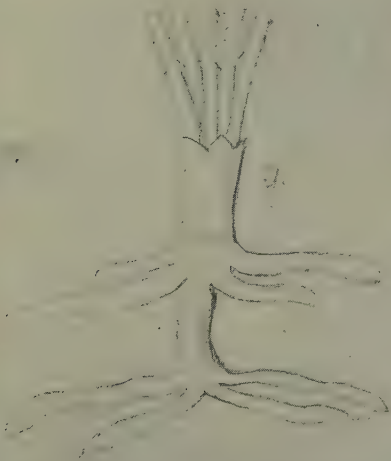
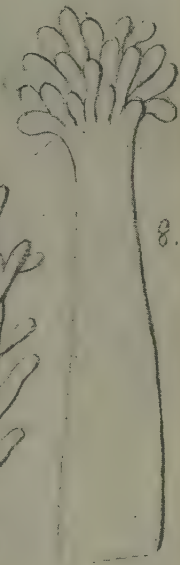
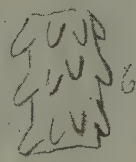
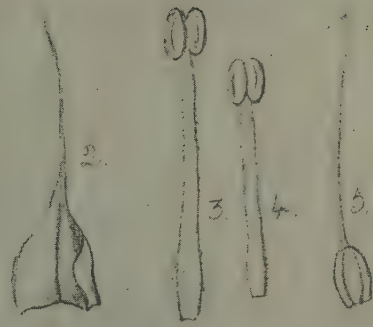
- Fig. 1. Adult plants.
- Fig. 2. Perianth.
- Fig. 3. Stamen.
- Fig. 4. Pistil.
- Fig. 5. Fruit.
- Fig. 6. Undehiscent fruit seen from above.
- Fig. 7. Seeds.
- Fig. 8. Trans. sect. of ovary.

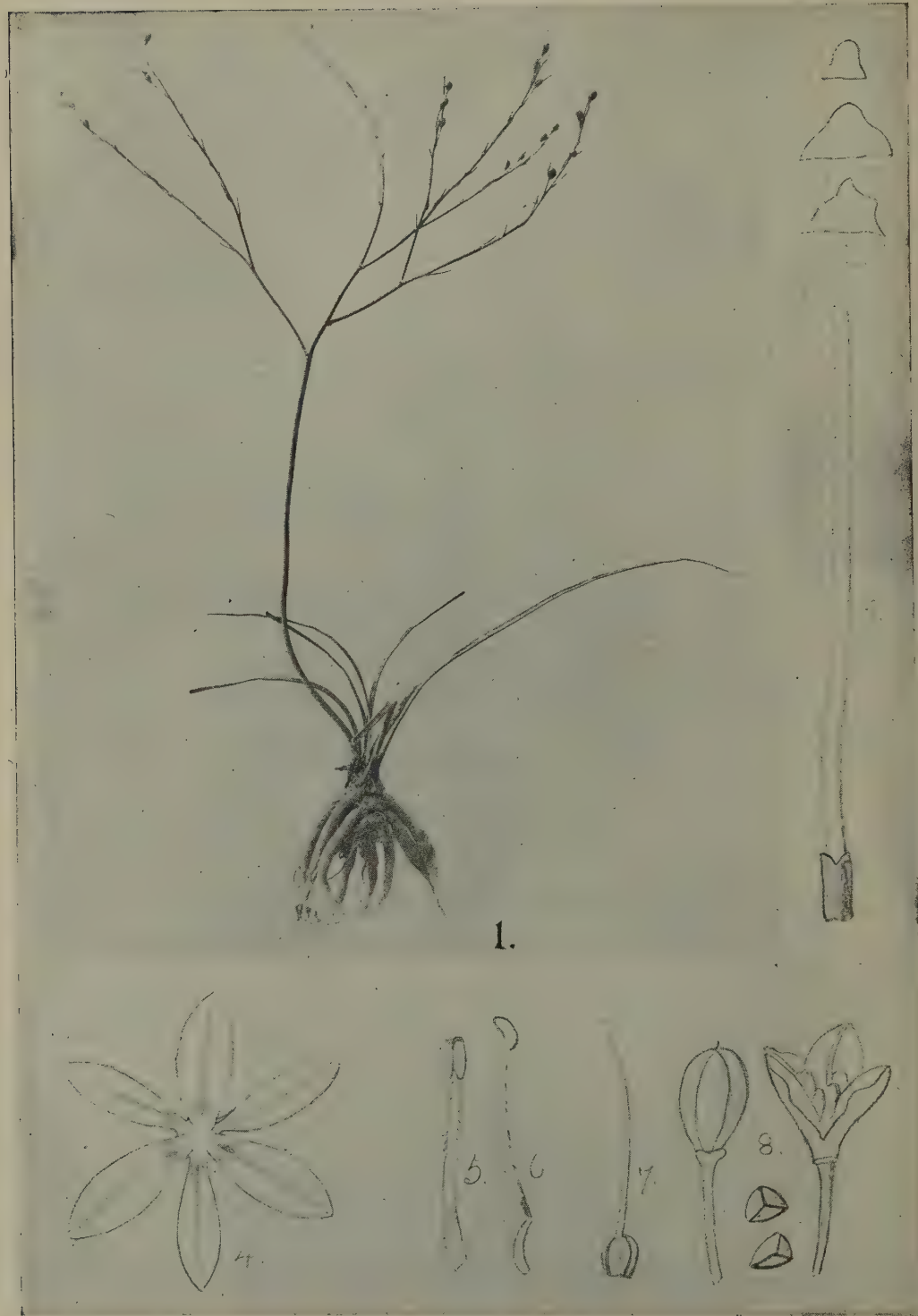
PLATE VII. FIGS. 1—9. *C. TUBERCULATUM*.

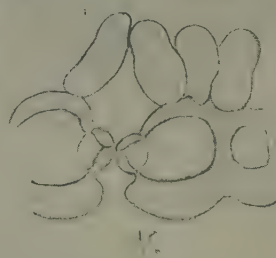
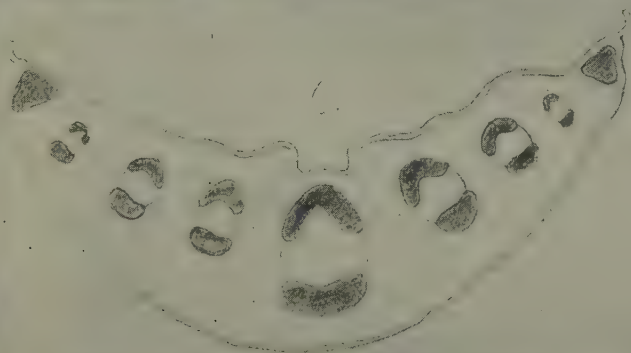
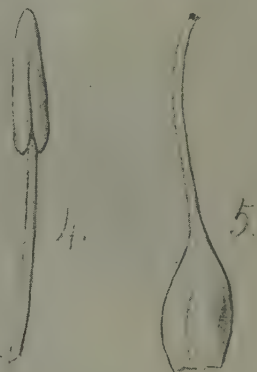
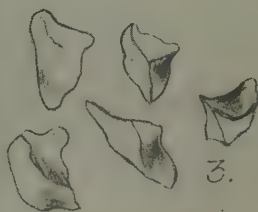
- Fig. 1. Adult plants in fruit.
- Fig. 2. Inflorescence.
- Fig. 3. Lowest fertile bract with two flrs. of different ages.
- Fig. 4. Trans. sect. of young fruit.
- Fig. 5. Seed.
- Fig. 6. Pistil.
- Fig. 7. Stamen.
- Fig. 8. Part of filament, magnified.
- Fig. 9. Roots.

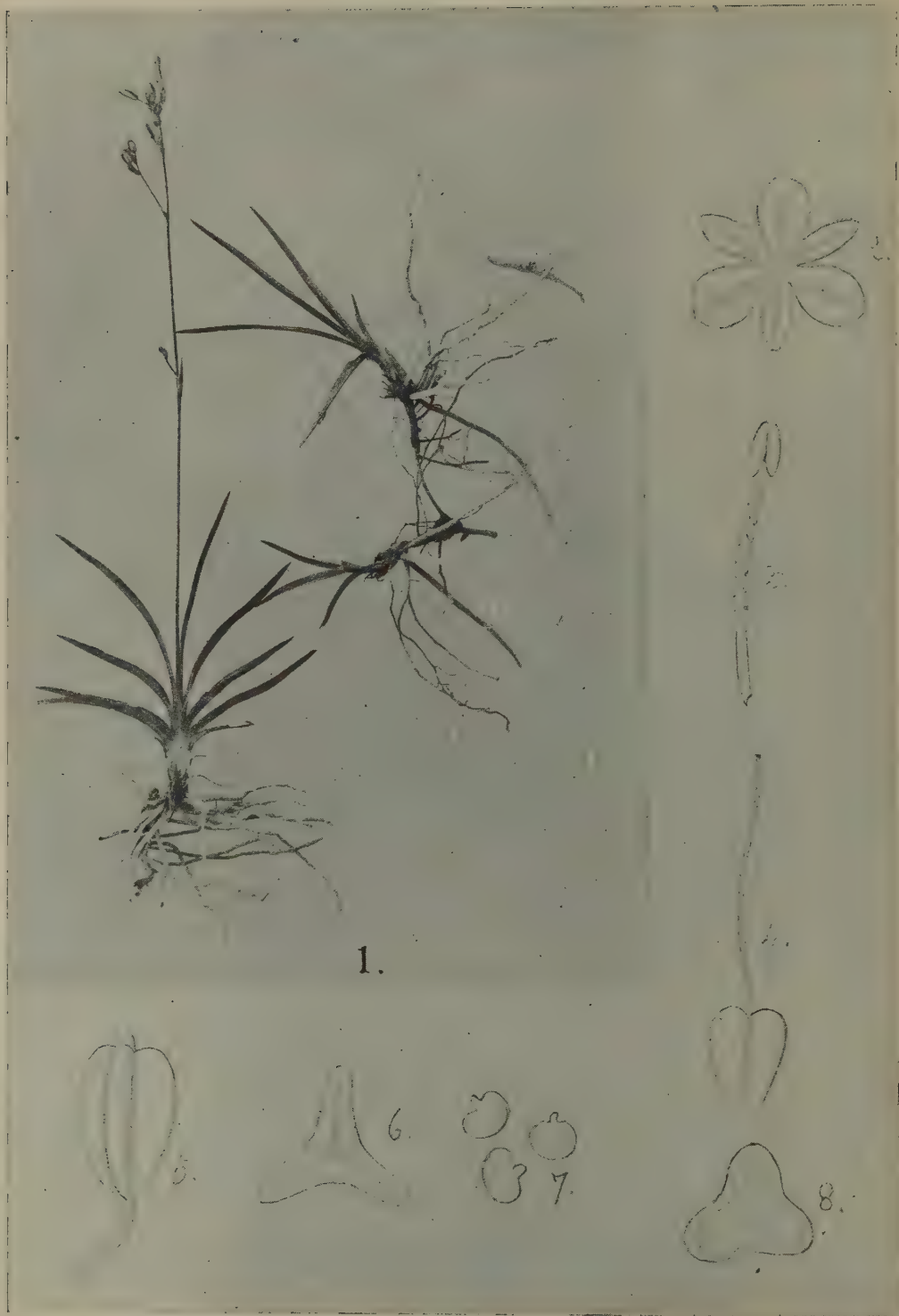














'N BYDRAE TOT ONS KENNIS VAN DIE
SUID-AFRIKAANSE USTILAGINALES
OF BRANDSWAMME.

INHOUD.

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'N BYDRAE TOT ONS KENNIS VAN DIE SUID-AFRIKAANSE USTILAGINALES OF BRANDSWAMME.

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Mikologie van die Uniwersiteit van Stellenbosch.)

INLEIDING.

As 'n voortsetting van die sistematiese studie van ons Afrikaanse swamme word die Ustilaginales of Brandswamme in hierdie bydrae behandel.

Aan Professor van der Byl kom my opregte dank toe vir die opdrag van hierdie studie, vir sy gedurige belangstelling daarin en veral vir sy Herbarium-eksemplare, wat hy vir studie-doeleindes tot my beskikking gestel het.

Die nommers tussen hakies in die beskrywings wat volg, is die nommers van die swamme in genoemde Herbarium.

Enige Brandswamme wat van Suid-Afrika aangeteken is, was nie tot my beskikking vir studie-doeleindes nie, en om hierdie verhandeling so volledig as moontlik te maak, neem ek die beskrywings van enkele sulke soorte oor van andere skrywers.

ALGEMEEN OORSIG.

Die Brandswamme is verpligtende parasiete en verskillende soorte kom op verskillende plante voor. Die bekendste soorte is natuurlik dié wat ekonomiese plante aantast, soos b.v. graan-, kafferkoring-, en mielieplante. Die Brandswamme van ekonomiese plante is natuurlik meer breedvoerig bestudeer geword as dié wat voorkom op wilde grasse of op plante wat nie veel ekonomiese belang het nie.

Hierdie swamme word brandswamme genoem omdat hul spoormassas bruin-swart van kleur is. Die wetenskaplike naam —*Ustilaginales*— van die reeks waartoe hul behoort, verwys ook na hierdie donkergekleurde spoormassas.

Dis eïenaardig van die brandswamme dat hul altyd hul spoormassas in 'n bepaalde orgaan van die voedsterplant vorm. Die grootste meerderheid verkies die vrugbeginsel van die voedsterplant wat hul vernietig en aldaar 'n stofagtige massa vorm; ander bepaal hul tot die pluim; ander weer tot die blare, terwyl nog ander minder kieskeurig is en hul spore in enige deel van die besmette plant vorm.

Spoormassas.

Die donkergekleurde spoormassas waarvan reeds melding gemaak is, bestaan uit miljoene van spore. By die meeste geslagte is die spoormassas stofagtig as die spore ryp is en die spore word dan deur die wind rondgewaai. By die geslag *Tilletia* en veral by die geslag *Cintractia* is die spoormassas meer kompak deurdat die spore meer aanmekaar kleef. In geval van die geslag *Entyloma* vorm die brandspore binne in die weefsel van die blaar van die besmette plant. Hulle is permanent in die blaarweefsels ingebed, word nie stofagtig nie en kom eers vry as die blare waarin hul is, wegvrot.

Spore.

Die spore waaruit die spoormassas bestaan is enkel of tot spoorbolle verenig. Laasgenoemde is of tydelik van aard, soos by die geslag *Sorosporium*, waar hul vroeër of later in aparte spoorsele opbreek, of permanent, soos by die geslagte *Tolyposporium*, *Tubercinia* en *Urocystis*. By die laaste geslag is die fertiele spoorsele omhul deur kleurlose en steriele skorsselle.

Die geslagte waar die spore van die spoormassas los vanmekaar is, d.i. enkel, is soms minder gemaklik van mekaar te onderskei. By die geslag *Cintractia* vorm die spore om 'n sentrale as of kolumella wat uit voedsterplantweefsel bestaan en die spore is hier selde stofagtig. Die geslag *Farysia* is onderskeibaar aan die donkergekleurde en steriele swamdrade wat daar tussen die spore is. Hierdie steriele swamdrade word springdrade of elaters genoem. Hul funksie is nie goed bekend

nie, maar na alle waarskynlikheid is hul behulpsaam by die vrysetting en verspreiding van die spore.

Soos reeds vermeld, is die brandspore van die geslag *Entyloma* permanent in die weefsels van die voedsterplant ingebed en kom hul eers vry as die besmette plantedeel wegvrot.

By die geslagte *Ustilago* en *Tilletia* is die kolumella en springdrade afwesig. Met die blote oog kan hierdie twee geslagte van mekaar onderskei word, deurdat die spoormassas van *Ustilago*-soorte heeltemal sigbaar is, terwyl dié van *Tilletia*-soorte binne in die besmette graankorrel is en dus nie so sigbaar is nie. Die spoormassas van die geslag *Tilletia* het 'n visagtige ruik en dit is die rede waarom die brandsiektes wat deur *Tilletia*-soorte veroorsaak word, populêr bekend staan as stinkbrand.

Soorte van die geslag *Ustilago* is soms moeilik onderskeibaar van die geslag *Sorosporium* nadat die spoorbolle van laasgenoemde geslag opgebreek het.

Die spore of fertiele spoorselle van al die brandswamme is donker van kleur en hul buitenste muur is of glad of met stekeltjies beset. Eienskappe van die spoormassas (b.v. of hul kompak of stofagtig is) en van die spore (b.v. hul grootte, of hul enkel of tot spoorbolle verenig is en of hul buitenste muur glad of met stekeltjies beset is) word gebruik om soorte van dieselfde geslag van mekaar te onderskei.

Ontkieming van die brandspore.

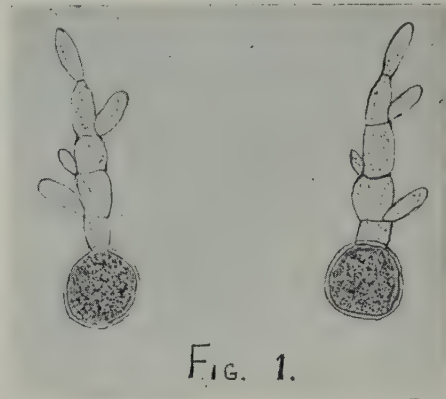
Die ontkieming van die brandspore vind plaas of sodra hul ryp is of eers na 'n korter of langer periode van rus.

Die kiembuis wat van die ontkiemende spore uitgroeï, ontwikkel nie tot 'n swamdraadweefsel nie, maar het 'n beperkte groei en dra weer spore. Dit is dus 'n promiselium, maar aangesien dit verwantskap wys tot die basiediums van die meer tiepiese *Badisiomycetes*, word dit ook as 'n basiedium beskou en word die spore wat daaraan vorm meestal basiediospore genoem. Die basiediospore kan weer geskikte voedsterplante infekteer.

In verband met die ontkieming van die brandspore kan nog vermeld word dat elke fertiele sel van 'n spoorbol afsonderlik ontkiem.

Volgens die geaardheid van die promiselium of basiedium word die brandswamme in onderstaande twee famielies gedeel :

Fam. **Ustilaginaceae.** Die basiediums, wat van die brand-spore ontwikkel, is deur dwarsmure in vier selle verdeel en die basiediospore ontwikkel in onbepaalde getalle by die tussenskotte sowel as aan die punt. (Fig. 1.)



Die onderstaande sleutel bevat die Suid-Afrikaanse geslagte van hierdie famielie.

Spore enkel of nie tot spoorbolle verenig nie :

Spoormassas poeieragtig as die spore ryp is :

Steriele swamdrade, ook springdrade genoem, tussen die spore.

Farysia.

Nie sulke drade tussen die spore nie.

Ustilago.

Spore kleef aanmekaar as hul ryp is en spoormassas dus minder poeieragtig :

Spoormassas vorm om 'n sentrale as wat uit voedsterplantweefsel bestaan.

Cintractia.

Spore tot spoorbolle verenig :

Spore breek gouer of later op.

Sorosporium.

Spoorbolle permanent.

Tolyposporium.

Fam. **Tilletiaceae**. Die basiediums wat van die brandspore ontwikkel, dra sekelvormige basiediospore net aar hul punt. (Fig. 2.)



Die Suid-Afrikaanse geslagte van hierdie famielie word in onderstaande sleutel aangegee :

Spore enkel of nie tot spoorbolle verenig nie :

Spore permanent in die voedsterplantweefsel ingebed.

Entyloma.

Spore nie permanent in die weefsel van die voedsterplant ingebed nie.

Tilletia.

Spore permanent tot spoorbolle verenig :

Fertiele spoorselle van 'n spoorbol omring deur steriele skorsselle wat ligter van kleur is as die fertiele.

Urocystis.

Fertiele spoorselle van 'n spoorbol nie omring deur steriele skorsselle.

Tubercinia.

Dit sal duidelik wees dat as 'n mens die geslagte van 'n brandswam volgens die aangehaalde sleutels wil vasstel, dit in die eerste instansie nodig sal wees om sy brandspore te ontkiem. Dit eis egter tyd en is ook nie altyd moontlik nie, en daarom gee ek hier 'n algemene sleutel wat die Suid-Afrikaanse geslagte van albei die famielies insluit.

Sleutel tot die geslagte van die *Ustilaginales*:

Spore enkel of tot spoorbolle verenig:

Spoormassas permanent in voedsterplantweefsel ingebed.

Entyloma.

Spoormassas stofagtig as die spore ryp is:

Springdrade aanwesig in die spoormassas.

Farysia.

Springdrade afwesig in die spoormassas:

Spoormassas binne in die graankorrel, nie duidelik sigbaar nie.

Tilletia.

Spoormassas duidelik sigbaar.

Ustilago.

Spore kleef aanmekaar en die spoormassas vorm om 'n sentrale kolumella van voedsterplantweefsel.

Cintractia.

Spore met mekaar tot spoorbolle verenig:

Spoormassas stofagtig as die spore ryp is:

Spoorbolle tydelik daar hul later opbreek.

Sorosporium.

Spoorbolle permanent:

Spoorselle omring deur skorselle.

Urocystis.

Spoorselle nie omring deur skorselle:

Spoormassas vorm onder die opperhuid van die blaar en blaarsteel.

Tubercinia.

Spoormassas vorm in die bloeiwyse.

Tolyposporium.

ENTYLOMA, de Bary.

de Bary, Bot. Zeit. XXXII., p.101 (1874).

Sacc. Syl. Fung. VII., p.487 (1888).

Spoormassas binne in die weefsels van die voedsterplant en gewoonlik in die blare waarop dit verkleurde vlekke vorm. *Spore* enkel, in groepies deur die weefsel versprei, gedra aan die ent van fertiele swamdrade wat nie heeltemal verdwyn nie, lig tot bruin gekleur, ontkiem binne in die voedsterplant en dan groei bundeltjies van promiseliums by die huidmondjies uit en dra hul basiediospore aan die oppervlakte van die voedsterplant; *epispoor* glad, gekleur, dik.

Soorte van Entyloma :

Spoormassas in bruin vlekke :

Spore liggekleur, 12.6—14.4 μ . **E.physalidis.** 1.

Spore bruin, 7.2—9.0 x 12.6—16.2 μ , **E.bidentis.** 2.

Spoormassas as grys vlekke met 'n donker en bepaalde rand :

Spore liggeel, 9.0—12.6 μ . **E.Dahliae.** 3.

1. **Entyloma physalidis** (K. & Cke.) Wint.

Winter Hedwigia, XXII, p.130 (1883). & XXIII, p.8 (1884).

Sacc. Syl. Fung. VII., p.494 (1888).

Spoormassas binne in die blare waarop hul bruin vlekke, 2—5 mm. diam. vorm. *Spore* 12.6—14.4 μ diam., min of meer bolvormig, liggekleur, met 'n korrelagtige inhoud; *epispoor* glad.

In blare van *Physalis*-soorte, Kilimanjaro, deur G. Volkens, ex Herb. botanico Berolinensi (1686).

Withania somnifera, Somers-et-Oos, deur MacOwan, ex Herb. botanico Berolinensi (1682).

Verder bekend in blare van *Physalis minima*, by Pretoria, en van *Physalis peruviana*, by Wellington, K.P., Grahamstad, Barberton en Pretoria (van der Byl).

2. *Entyloma bidentis*, P. Henn.

P. Henn. Pilz. Ostafrik., p.49.

Sacc. Syl. Fung. XIV., p.24 (1899).

Spoormassas binne in die blare waarop hul ronde bruin vlekke vorm, die vlekke loop dikwels inmekaar. *Spore* 7.2—9.0 x 12.6—16.2 μ , min of meer bolvormig, ligbruin tot bruin, inhoud korrelagtig; *epispor* 1.3 μ dik, glad.

In blare van *Bidens pilosa*, Kilimanjaro, deur G. Volkens, ex Herb. botanico Berolinensi (1683). Verder bekend van Pretoria, Potchefstroom (van der Byl), en Kentani (Pegler).

3. *Entyloma Dahliae*, Syd.

Sydow in Annales Mycologici, X., p.36 (1912).

Spoormassas binne in die blare waarop hul ronde tot elliptiese vlekke, 4—10 mm. diam., vorm, die vlekke is asgrys van kleur met 'n donkere rand. *Spore* 9.0—12.6 μ in diam., min of meer bolvormig, liggeel, inhoud korrelagtig; *epispor* 1.3—2.7 μ dik, glad.

In blare van *Dahlia*-soorte, Nortora, Rhodesië, deur F. Eyles 46 (2026).

Oorspronklik beskrywe van *Dahlia variabilis*, Harden Heights, Natal.

FARYSIA, Raciborski.

Bull. Ac. Sc. Cracovie, p.354 (1909).

Sacc. Syl. Fung. XXI., p.527 (1912) & XXIII., p.631 (1925).

E. Fischer, Ann. Myc. XVIII., p. 193 (1920).

Sinoniem:

Elateromyces, Bubak Houby České p. 32 (1912).

Pilze Bohmens 11 T. Brandpilze p.31 (1916).

Sacc. Syl. Fung. XXIII. p. 631 (1925).

Spoormassas donkergekleur vorm in die vrugbeginsel van die voedsterplant, stofagtig as die spore ryp is. *Spore* enkel, verskillend in vorm, bolvormig tot hoekig, gekleur, gemeng met swamdrade of springdrade; *epispor* gekleur, glad of stekelig.

Farysia olivacea (D.C.) Syd.

Ann. Mycol. XVII., p.41 (1919).

Sacc. Syl. Fung. XXIII., p.631 (1925).

*Sinonieme:**Uredo olivacea*, D.C.Fl. Franc. VI., p.78.*Ustilago olivacea*, (D.C.) Tul. Sacc. Syl. Fung. VII., p.463 (1888).*Ustilago caricicola*, Tracy & Earl. Sacc. Syl. Fung. XVI., p.368 (1902).*Ustilago catenata*, Ludwig. Zeitschr. Pflanzenkr. III., p.139 (1893).*Ustilago subolivacea*, P. Henn. Sacc. Syl. Fung. XIV., p.412 (1899).*Elatromyces olivacea* (D.C.) Bubak. Pilze Bohmens 11 T. Brandpilze, p.31 (1916).

Spoormasas vorm in die vrugbeginsels van *Carex*-soorte wat heeltemal vernietig word, olyfbruin tot donkerbruin, eers kompak, later stofagtig. *Spore* 5.4—9.0 x 3.6—9.0 μ of 9.0 μ diam., onreëlmstig in vorm, peer-, eier-, nier-, disk- of bolvormig, lig-olyfbruin gemeng met swamdrade of springdrade; *epispoor* .9 μ dik, gekleur, onduidelik gestippel.

In vrugbeginsels van *Carex ethiopica*, Knysna (2316). Ook bekend in vrugbeginsels van *Carex phacota*, Kentani (Pegler).

TILLETIA, Tul.

Ann. Sc. Nat. p.112 (1874).

Sacc. Syl. Fung. VII., p.81 (1888).

Spoormasas vorm in verskillende dele van die voedsterplant maar meestal in die vrugbeginsel wanneer dit deur die saadhuide omhul is, stofagtig, en met 'n visagtige ruik. *Spore* enkël en los van mekaar, bolvormig; *epispoor* gekleur, glad of met verhewe plooi wat 'n netvormige voorkome aan die spore gee.

Tilletia-soorte op graan word met die blote oog onderskei van *Ustilago*-soorte deurdat die spoormasas van eersgenoemde deur die saadhuide omhul is en dus nie duidelik sigbaar is.

Soorte van *Tilletia*:Epispoor netvormig. **T. Tritici.** 1.Epispoor glad. **T. laevis.** 2.1. **Tilletia Tritici** (Bjerk.) Wint. (Illus. 5.)

Winter, Die Pilze, p.110 (1884).

Sacc. Syl. Fung. VII., p.481 (1888).

Sinonieme:

Lycoperdon Tritici, Berk. in Act. Suec., p.326 (1775).
Tilletia caries, Tul. Mem. Ust., p.113 (1847).

Spoormassas in die vrugbeginsels van koringplante, olyfkleurig tot donkerbruin, stofagtig, en met 'n visagtige ruik, deur die saadhuid en die kaffies bedek. *Spore* 14.4—18.0, soms 21.6 μ diam., min of meer bolvormig, olyfkleurig tot bruin, donkerder in massa; *epispoor* met verhewe plooi wat 1.5—1.8 μ hoog is en 'n veelhoekige netwerk vorm, .9—1.9 μ dik.

In vrugbeginsels van *Triticum vulgare*, Lady Grey (2098) deur R. I. Nel.

2. ***Tilletia laevis***, Kuehn.

Hedwigia XII., p.152 (1873).

Sinonieme:

Ustilago foetens, Berk. & Curt. Grev. III, p.59 (1874).
Tilletis foetens (B. & C.) Trel., Parasit. Fung. Wis., p.35 (1884).

Spoormassas in die vrugbeginsels van koringplante, olyfkleurig tot donkerbruin, stofagtig, met 'n visagtige ruik,* deur die saadhuid en die kaffies bedek. *Spore* 14.4—19.8, soms tot 25.2 x 14.4—16.2 μ , min of meer bolvormig tot effens ellipties, olyfkleurig tot bruin, donkerder in massa; *epispoor* glad, .9 μ dik.

In vrugbeginsels van *Triticum vulgare*, Caledon, deur skrywer (2183).

Spore van *T.laevis* en *T.Tritici* word dikwels in een en dieselfde spoormassa aangetref.

Die hierbo beskryfde *Tilletia*-soorte is die oorsaak van stinkbrand by koringplante.

USTILAGO (Pers.) Roussel.

Pers. Syn. Fung., p.224 (1801).

Roussel, Fl. Calvados ed. 2., p.47 (1806).

Sacc. Syl. Fung. VII., p.451 (1888).

*Die ruik word toegeskryf aan die aanwesigheid van trimetielamien in die spore. Brood gebak van meel wat baie spore van hierdie swam bevat, het 'n onaangename smaak.

Spoormassas donkergekleur, vorm in verskillende dele van die voedsterplant, maar meestal in die vrugbeginsel, vernietig soms die hele bloeiwyse, stofagtig as die spore ryp is. *Spore* enkel, verskil in vorm, lig tot donkergekleur; *epispoor* gekleur, glad of stekelig.

Soorte van *Ustilago* :

Op kultuurgewasse van die famielie Gramineaceae :

Op Koringplante.	U. Tritici.	1.
Op Garsplante :		
Spore glad.	U. Jensenii.	2.
Spore stekelig.	U. nuda.	3.
Op Hawerplante.	U. Avenae.	4.
Op Mielieplante.	U. Zeae.	5.
Op Suikerriet.	U. Sacchari.	6.
Op ander grasplante :		

Spore glad :

Spoormassas byna heeltemal ingesluit deur die blaarskede van die bloeiwyse.

U. Ischaemi. 7.

Spoormassas nie deur blaarskede ingesluit :

 Spore bolvormig.

U. Dregeana. 8.

 Spore hoekig.

U. affinis. 9.

Spoormassas omhul deur die mure van die vrugbeginsel en wat aan die punt oopbreek as die spore ryp is.

U. Evansii. 10.

Spore met breë stekels.

U. heterospora 11.

Spore vratagtig.

U. bromivora. 12.

Spore netvormig bevrat.

U. pretoriensis 13.

Op plante van die famielie Liliaceae :

 Spore glad.

U. Vaillantii. 14.

 Spore bevrat.

U. Peglerae. 15.

1. **Ustilago Triticici** (Pers.) Rostr.

Rostr. Overs. Danske Vid. Selsk. Forh. 15 (1890).

Sacc. Syl. Fung. IX., p. 283 (1891).

Sinonieme:

Ustilago segetum var. *Triticici*, Jens., Om. Korns. Brandp., p.61 (1888).

Ustilago Triticici (Pers.) Jens., Jensen, Ann. Rep. Kans. Agr. Exp. Stn. II., p.262 (1890).

Spoormassas stofagtig in die vrugbeginsels van koringplante, eers bedek deur 'n dun vlies wat uit voedsterplantweefsel bestaan en wat later verdwyn, hele bloeiwyse van besmette plant word vernietig en vervang deur die donkergekleurde spoor-massas, nadat die spore weggewaai het bly net die aarspil staan. *Spore* 5.4—7.2 μ of 3.6—5.4 \times 7.2—9.0 μ , min of meer bolvormig, lig-olyfkleurig, aan die een kant effens donkerder as aan die ander; *epispoor* effens stekelig, 1.0 μ dik.

In are van *Triticum vulgare*, Stellenbosch (2361); Hopefield (2360); Moorreesburg, deur skrywer, 134. Hierdie swam is die oorsaak van losbrand by koring.

2. **Ustilago Jensenii**, Rostr.

(Illus. 3.)

Rostr., Overs. K. Danske Vid. Selsk. Forh., p.12 (1890).

Sinonieme:

Ustilago segetum (Bull.) Dittm., in Sturm, Deutsch. Flora III. I : 67 (1817).

Ustilago Hordei (Pers.) Kell. & Sw. Ann. Rep. Kans. Agr. Exp. Stn., p.268 (1890).

Spoormassas in die vrugbeginsels van garsplante, 'n betreklik kompakte massa, omhul deur die kaffies en die mure van die vrugbeginsel. *Spore* 5.4—7.2 \times 5.4 μ , min of meer bolvormig, enkele ellipties, bruinagtig; *epispoor* glad, 1.8 μ dik.

In are van *Hordeum vulgare*, Stellenbosch (247); Salisbury deur F. Eyles (1732). Ook bekend in distrikte van Transvaal en die Vrystaat (van der Byl).

Hierdie swam veroorsaak bedekte brand by gars.

3. **Ustilago nuda** (Jens.) Kell. & Sw. (Illus. 4.)

Kell. & Sw. Ann. Rep. Kans. Exp. St., p.277
(1890).

Sacc. Syl. Fung. IX., p.283 (1891).

Sinonieme:

Ustilago segetum (Bull.) Dittm. in Sturm, *Deutschl., Flora III.* 1: 67
(1817).

Ustilago Hordei, Bref. *Neue Unters. ueber die Brandp. und die
Brandkr. II. Nachricht. u.d. Club d. Landwirte zu Berlin*, p.1577
(1888).

Spoormassas stofagtig, in die vrugbeginsels van garsplante, eers bedek deur 'n dun vlies wat uit voedsterplantweefsel bestaan en wat later verdwyn, hele bloeiwyse van besmette plant word vernietig en vervang deur die donkergekleurde spoormassas, nadat die spore weggewaai het bly net die aarspil staan. *Spore* 5.4—7.2 x 4.5—5.4 μ , min of meer bolvormig, dikwels effens plat aan die een kant, lig-olyfbruin; *epispor* effens stekelig, 1.4 μ breed.

In are van *Hordeum vulgare*, Philadelphia, Kaap (248); Brandfort, O.V.S., deur skrywer, 280. Ook bekend van Somerset-Oos.

Hierdie swam is die oorsaak van losbrand by garsplante.

4. **Ustilago Avenae** (Pers.) Jens. (Illus. 2.)

Jens. Charb. Cereal, p.4 (1889).

Sacc. Syl. Fung. IX., p.283 (1891).

Sinonieme:

Ustilago segetum (Bull.) Dittm. in Sturm, *Deutschl. Flora III.*, 1: 67
(1817).

Ustilago perennans, Rostr., Overs. K. Danske Vid. Selsk. Forh., p.15
(1890).

Spoormassas in bloeiwyse van hawerplante en vernietig gewoonlik alle blomdele. Ná die spoormassas weggewaai het, bly die aarspil alleen oor. *Spore* 7.2—9.0 x 4.5—7.2 μ , min of meer bolvormig, dikwels eivormig, lig tot olyfkleurig; *epispor* met baie kort maar duidelike stekeltjies beset, 1.8 μ dik.

In are van *Avena sativa*, Stellenbosch (86), Malmesbury (2381). Ook bekend van Aliwal-Noord, Transvaal en ander streke waar hawer verbou word.

Hierdie swam is die oorsaak van losbrand by hawerplante.

5. **Ustilago Zeae** (Beckm.) Unger.

Unger Infl. Bodens, p.211 (1836).

Saac. Syl. Fung. VII., p.472 (1888).

Sinonieme:

Lycoperdon Zeae, Beckm. Hannov. Mag. VI., p.1330 (1768).

Ustilago maydis, Corda Ic. Fung. V., p.3 (1842).

Ustilago Zeae-mays, Wint. Rab. Krypt. Fl. 1, p.97 (1881).

Spoormassas bruin-olyfkleurig, ontwikkel in enige orgaan van die mielieplant as 'n blaasagtige swelsel, eers bedek deur 'n loodkleurige vlies wat uit voedsterplantweefsel bestaan. *Spore* 7.2—9.0 μ diam., bolvormig, helder ligbruin; *epispoor* met klein stekeltjies beset, 1.9 μ dik.

Op vroulike bloeiwyse van *Zea Mays*, Durban (516), deur Eddie Bam. Ook bekend van Standerton, Tvl., Maraisburg.

Hierdie swam is die oorsaak van blaasbrand by mielies.

6. **Ustilago Sacchari**, Rabenh.

Rabenh. in Isis (1870).

Sacc. Syl. Fung. VII., p.456 (1888).

Beskrywing oorgeneem van Saccardo.

Spoormassas swart; *spore* bolvormig of min of meer hoekig, 8.0—18.0 μ diam., olyfbruin tot rooiagtig; *epispoor*, dik glad.

In stam en bloeiwyse van *Saccharum officinarum*. Bekend van Natal (Wood).

7. **Ustilago Ischaemi**, Fck.

Fck. Enum. Fung. Nass., p.22 (1861).

Sacc. Syl. Fung. VII., p.454 (1888).

Spoormassas in bloeiwyse van die voedsterplant en vernietig alle blomdele behalwe die blom-as en vervang deur die donkergekleurde spoormassas, 'n besmette bloeiwyse bly byna heel-

temal deur sy blaarskede ingesluit. *Spore* 9.0—12.6 of 14.4 x 9.9 μ , min of meer bolvormig, soms eivormig, bruin; *epispoor* glad, .9 μ dik.

In bloeiwyse van *Andropogon*-soorte, Sansibar-kus, Mombassa, deur Hildebrandt, ex. Herb. botanico Berolinensi (1689); S.W. Albert Niansa deur Stuhlman, ex Herb. botanico Berolinensi (1692). Ook bekend op *Andropogon*-soorte in Transvaal en in Natal (van der Byl).

8. *Ustilago Dregeana*, Tul.

Tul. in Ann. Sc. Nat., p.83 (1847).

Sacc. Syl. Fung. VII., p.467 (1888).

Sinoniem:

Ustilago cynodontis, P. Henn. Fungi Afr. 1, p.369.

Spooormassas swart, stofagtig, in die aartjies van die voedsterplant, vernietig die jong blomdele terwyl hulle nog bedek is deur die skutblaartjies. *Spore* 7.2—9.0 x 3.6—5.4 μ of 7.2—8.1 μ diam., bol- of eivormig, ligbruin; *epispoor* glad, 1.8 μ dik.

In bloeiwyse van *Cynodon dactylon*, Stellenbosch (667), deur mej. O. J. Leisk. Ook bekend van Somerset-Oos (MacOwan); Vryburg, en van Transvaal (van der Byl).

9. *Ustilago affinis*, Ellis & Ev.

Ellis & Ev. Cockerell, Bull. Torey Club, 20, p.297 (1893).

Sinonieme:

Ustilago Stenotaphri, P. Henn. Hedwigia 37, p.293 (1893).
(Nie *U. Stenotaphri*, McAlpine.)

Ustilago Stenotaphri, Massee, Kew Bull., p.184 (1899).

Ustilago Henningsii, Sacc. & Syd. Sacc. Syl. Fung. XVI., p.368 (1902).

Spooormassas swart, stofagtig, in die vrugbeginsel van die voedsterplant. *Spore* 5.4—7.2 μ diam., min of meer bolvormig, hoekig tot langwerpig, ligbruin; *epispoor* glad, .9 μ dik.

In vrugbeginsels van *Stenotaphrum glabrum*, Windhoek, deur R. Schlechter, ex Herb. botanico Berolinensi (1681).

10. **Ustilago Evansii**, P. Henn.

P. Henn. Eng. Bot. Jahr. XLI., p.270 (1906).

Sacc. Syl. Fung. XXI., p.508 (1912).

Spoormassas olyfkleurig, stofagtig, in vrugbeginsel van die voedsterplant, omhul deur die mure van die vrugbeginsel wat aan die punt oophreek as die spore ryp is. *Spore* 14.4—16.2 μ diam., bolvormig, liggeel tot 'n deurskynend bruin; *epispoor* glad, 1.8—2.0 μ dik.

In vrugbeginsels van *Setaria*-soorte, Salisbury, deur F. Eyles, 2088 (1810); lokaliteit ?, Rhodesië, deur F. Eyles, 56 (2021).

11. **Ustilago heterospora**, P. Henn. & Evans.

P. Henn. & Evans. Pilze, Ostafrik., p.48.

Sacc. Syl. Fung. XIV., p.413 (1899).

Spoormassas bruin, mettertyd stofagtig, in die vrugbeginsel van die voedsterplant wat gevul word met 'n bruin massa. *Spore* 12.6—14.4 of 14.4 x 10.8—12.6 μ , min of meer bolvormig of effens eiovormig, liggeel tot bruin; *epispoor* met breë stekels beset, 1.3 μ dik.

In vrugbeginsels van *Panicum maximum*, Usambara, O.-Afrika, deur L. Zimmerman, ex Herb. botanico Berolinensi (1687). Ook bekend van Transvaal (van der Byl); Natal (Wood); en Sansibar (Hildebrandt).

In vrugbeginsels van *Panicum spicatum*, Kwango, Kisombu, O.-Afrika, deur H. Vanderyst, ex Herb. botanico Berolinensi (1688).

12. **Ustilago bromivora** (Tul.) F. v. Wald.

F. v. Wald. Bull. Soc. Nat. Mosc. XL., p.252 (1867).

Sacc. Syl. Fung. VII., p.461 (1888).

*Sinonieme:**Ustilago carbo*, var *bromivora*, Tul. Ann. Sc. Nat. VII., p.81 (1847).**Cintractia patagonica*, Cke. & Mass. Grev. 18, p.34 (1889).

*Clinton wat die tiepe eksemplaar van *C.patagonica* op *Bromus unioides* ondersoek het, beskou dit identies met *Ustilago bromivora*.

Spoormassas swart, 'n puisvormige liggaam in die vrugbeginsel van die voedsterplant, eers bedek deur die kafblaartjies wat 'n loodkleurige glans kry en wat later opbreek as die spore ryp is. *Spore* 7.2—9.0 x 5.4—9.0 μ of 8.1—9.0 μ diam., hoekig, breed ellipties of min of meer bolvormig, donkerbruin; *epispor* fyn bevrat, 1.0 μ dik.

In vrugbeginsels van *Bromus unioloides*, Hopefield (1314); Stellenbosch (249). Ook bekend in distrikte van Transvaal en die Vrystaat.

13. **Ustilago pretoriensis**, Evans.

Evans Annales Mycologici XII., p.261 (1914).

Beskrywing oorgeneem van Evans.

Spoormassas poeieragtig, in die vrugbeginsels van besmette plante, swart-olyfkleurig, eers bedek deur 'n bruin-muisvaal vlies, besmette vrugbeginsel groei tot reguit of gedraaide horingvormige swelsels uit wat 1—3.5 cm. lank is en 2—3 cm. breed. *Spore* 9—12 μ , min of meer bolvormig, olyfbruin, duidelik netvormig bevrat.

Bekend in vrugbeginsel van *Panicum helopodis* var. *glabrescentis*. Pretoria, Tvl.

14. **Ustilago Vaillantii**, Tul.

Tul. Mém. sur les Ustilag. in Ann. Sc. Nat., p.90 (1847).

Sacc. Syl. Fung. VII., p.465 (1888).

Spoormassas geel-olyfbruin, later swart, stofagtig, in die vrugbeginsels en helmknoppies. *Spore* variëer in grootte en vorm, 5.4—17.2 x 5.4—10.8 μ , bolvormig tot hoekig, langwerpig tot ellipties, liggeel; *epispor* glad.

In blomme van 'n *Scilla*-soort, Stellenbosch (2398). Ook bekend in blomme van *Scilla Kraussia* by Inanda (Wood).

15. **Ustilago Peglerae**, Bubak & Syd.

Bubak & Sydow. Annales Mycol. XII., p.264 (1914).

Beskrywing oorgeneem van Bubak & Sydow.

Spoormassas olyfswart, vernietig die helmknoppies. *Spore* groenbruin, ellipties, langwerpig tot onreëlmatig, selde min of

meer bol- tot eivormig, $9.5-18.0 \times 7.0-9.5 \mu$, oppervlakte bevrat.

In helmknoppies van *Ornithogalum lacteum*, Kentani. Ook bekend op *Eucomis punctata*, Kentani (Pegler).

U. Peglerae is na verwant aan *U. Vaillantii*, maar verskil volgens Bubak en Sydow van hierdie soort in sy bevratte spore.

CINTRACTIA, Cornu.

Cornu, Ann. Sc. Nat. ser. iv. XV., p.279 (1883).

Sacc. Syl. Fung. VII., p.480 (1888).

Spoormassas in verskillende organe van die voedsterplant, hulle ontwikkel om 'n sentrale kolumella of as wat uit plante-weefsel bestaan, die afsonderlike spore kleef aanmekaar. *Spore* enkel, min of meer bolvormig of hoekig; *epispor* gekleur, fyn bevrat.

Hierdie geslag word van die geslag *Ustilago* onderskei aan sy kolumella en aan sy saamgekleefde spore. Die spore word net los van mekaar nadat hul vog van die omgewing opgeneem het.

Soorte van Cintractia :

Spoormassas vorm om blomsteel-

Spore $6.3-7.2 \mu$.

C. leucoderma. 1.

Spoormassas vorm in die bloei-
wyse :

tjies.

Spore $9.0-13.5 \mu$.

C. Sorghi-vulgare. 2.

C. togoensis. 3.

1. **Cintractia leucoderma** (Berk.) P. Henn.

P. Henn. Hedwigia XXXIV., p.335 (1895).

Sacc. Syl. Fung. XIV. p.420 (1899).

Sinonieme :

Ustilago leucoderma, Berk. Ann. Mag. Nat. Hist. II. 9, p.200 (1852).

Cintractia krugiana, P. Magn. Bot. Jahr. XVII., p.490 (1893).

Cintractia affinis, Peck, N.Y. State Mus. Bull. 57, p.28 (1903).

Spoormassas $3-10 \text{ mm}$. lank, vorm om die blomsteeltjie van die voedsterplant 'n langwerpige of eivormige liggaampie, bedek deur 'n wit dik vlies wat mettertjyd stadigaan wegval en

die swart kompakte en saamgekleefde spoormassas vertoon. Spore 14.4—16.2 μ diam. of 14.1—17.1 x 10.8—14.4 μ , min of meer bolvormig, langwerpig of hoekig; helder donkerbruin; *epispor* fyn bevrat,* 1.4 μ dik.

Om die blomsteel van *Rynchospora*-soorte, Suid-Kameroon, deur Mildbraer, ex Herb. botanico Berolinensi (1700).

By die ondersoek van materiaal (1691) wat Henning geïdentifiseer het as var. *usambariensis*, P. Henn. van die hierbo beskryfde soort, vind ek geen voldoende eienskappe om dit as sodanig te beskou nie.

2. *Contractia Sorghi-vulgaris*, Clinton. (Illus. 1.)

Clinton, Bull. Ill. Exp. St. 47 : 404. 1897.

Sinonieme:

Sporisorium Sorghi, Link *Sp. II.*, p.86.

Tilletia Sorghi-vulgaris, Tul. *Mém. sur les Ustilag. in Ann. Sc. Nat.*, p.116 (1847).

Ustilago Sorghi (Link) Pass. Thum. *Hedwigia* 12, p.114 (1873).

Ustilago tulasnei, Kuehn, *Ber. Sitz. Nat. Ges. Halle* (1874).

Sphacelotheca Sorghi (Link) Clinton, *Journ. Myc. VIII.*, p.140 (1902).

Spoormassas rond of langwerpig, gewoonlik in die vrugbeginsels, soms ook in die meeldrade, eers omhul deur 'n valse vlies wat mettertyd breek; as die donkerbruin spoormassas versprei is, word 'n dun kolumella van planteweefsel blootgestel; saadkorrels wat spoormassas bevat aanmerklik vergroot. Spore 6.3—7.2 μ diam., min of meer bolvormig, bruin, donkerder in massa; *epispor* .9 μ dik, glad.

Andropogon Sorghum (Kafferkoring), Schroeders, Natal (533); Kroonstad (2106) deur W. H. van der Merwe.

Ook bekend van Basoetoeland en streke van die Oranje-Vrystaat en Transvaal waar kafferkoring verbou word.

Hierdie swam is die oorsaak van pitbrand by kafferkoring.

*Hoewel Berkley die spore as glad beskou, stem ek saam met McAlpine dat hulle fyn maar duidelik bevrat is.

3. **Cintractia togoensis**, P. Henn.

P. Henn. Eng. Bot. Jahr. XXXVIII., p.119 (1905).
Sacc. Syl. Fung. XXI., p.510 (1912).

Spoormassas vorm in die aartjies van die voedsterplant en vernietig die blomdele wat vervang word deur 'n saamgekleefde, onreëlmatig, donkergekleurde massa, deels beskerm deur die kafblaartjies. *Spore* 9.0—13.5 μ , min of meer bolvormig tot ellipties, ligbruin; *epispoor* glad.

In bloeiwyse van 'n *Cyperus*-soort, Durban, Natal (247).

SOROSPORIUM, Rud.

Rud. Linnaea IV., p.116 (1829).
Sacc. Syl. Fung. VII., p.511 (1888).

Spoormassas stofagtig, donkergekleur, in verskillende dele van die voedsterplant maar veral in die bloeiwyse. *Spore* verenig tot groepies of spoorbolle wat opbreek as die spore ryp is, donkergekleur, min of meer bolvormig; *epispoor* gekleur, glad of met klein stekeltjies beset.

Dis dikwels moeilik om die geslag *Sorosporium* van die geslag *Ustilago* te onderskei, aangesien die spoorbolle maar van 'n tydelike aard is. Vir sistematiese studie is dit wenslik om sover as moontlik ook die jongere stadiums te versamel.

Soorte van *Sorosporium*:

Spoormassas duidelik sigbaar:

Op Zea- & Andropogon-
soorte.

S. Reiliana. 1.

Op Panicum-soorte.

S. Panici-miliacei. 2.

Spoormassas binne in die vrug-
beginsel, byna onsigbaar.

S. Holstii. 3.

1. **Sorosporium Reilianum** (Kuehn.) McAlpine.

McAlpine, The Smuts of Australia, p.181 (1910).

Sinonieme:

Ustilago Reiliana, Kuehn. Rab. Fung. Eur. No. 1998 (1875).

Cintractia Reiliana (Kuehn.) Clinton, Bull. Ill. Agr. Exp. Stn. No. 57,
p.54 (1900).

Sphacelotheca Reiliana (Kuehn.) Clinton, Journ. Myc. VIII., p.141
(1902).

**Sorosporium Simii*, Pole Evans, Rep. S.A. Ass. Adv. of Sc. XII., p.54 (1915).

Spoormassas in die pluim en in die vroulike bloeiwyse van die voedsterplant, swartagtig, eers kompak maar later stofagtig, in baie gevalle vernietig dit die hele bloeiwyse, dikwels deur die blaarskede beskerm, as die stofagtige spoormassa weg-gewaaï het, dan bly die kaal blomsteel alleen oor. *Spoorbolle* 75.6—104.4 μ , bol- of onreëlmatig bolvormig, donkerbruni, breek gou op. *Spore* 9.0—12.6 μ diam., min of meer bolvormig, bruin maar swart in massa; *epispoor* met klein stekeltjies beset, 1.4—1.8 μ dik.

In pluim van *Zea Mays*, Brandfort, O.V.S., deur skrywer 7 (2359). Verder bekend in die mieliestreke van die Oranje-Vrystaat, Transvaal en oostelike dele van die Kaapprovinsie.

Hierdie swam is die oorsaak van pluim en kopbrand by mielies.

In bloeiwyse van *Andropogon halepensis* (*Sorghum halepense*), Soeloeland (44). Ook bekend van Maritzburg, Natal (Sim).

2. *Sorosporium Panici-miliacei* (Pers.) Takahashi.

Takahashi, Tok. Bot. Mag. XV., p.247 (1902).

Sinoniem:

Ustilago Panici-miliacei (Pers.) Wint. die Pilze, p.89 (1884).

Beskrywing oorgeneem van McAlpine. §

Spoormassas in die bloeiwyse van die voedsterplant, vernietig die aartjies en veroorsaak 'n vergroting van die vrugbeginsels, somtyds word alleen 'n deel van die bloeiwyse aangetas, bedek deur 'n vlies wat bestaan uit swamdrade en die opperhuidselle van die besmette deel van die bloeiwyse. *Spoorbolle* onreëlmatig

*Vir my is daar geen verskil tussen *Sorosporium Simii* en *Sorosporium Reilianum* nie. Die feit dat *S.Reilianum* (as *Ustilago Reilianum*, Kuehn.) op *Andropogon halepensis* (*Sorghum halepense*) deur andere werkers (Sydow en Butler: *Annales Mycologici* X., p.249; Malkoff: *Annales Mycologici* VI., p.30) gedetermineer is, staaf ook my bevinding dat *Sorosporium Simii* na alle waarskynlikheid nie 'n afsonderlike soort is nie.

§McAlpine, *Smuts of Australia*, p.179 (1910).

in vorm en variëer in grootte, bolvormig, eiervormig, langwerpig of veelhoekig, donkerbruin, 50—100 μ lank. *Spore* 9.0—13.0 μ diam., of 9.0—14.0 x 8.0—11.0 μ , min of meer bolvormig tot hoekig of ellipties, geelbruin; *epispoor* vas, met baie fyn stekels.

Bekend op *Panicum*-soorte in Transvaal (van der Byl).

3. **Sorosporium Holstii**, P. Henn.

P. Henn. Pilz. Ost. Afr., p.49.

Sacc. Syl. Fung. XIV., p.428 (1899).

Spoormassas stofagtig, swart, in die vrugbeginsel van die voedsterplant, vir die blote oog byna nie sigbaar nie omdat dit binne in die saad is. *Spoorbolle* 27.0—90' μ , variëer in vorm en grootte, min of meer bolvormig tot langwerpig, swart. *Spore* 9.0—12.6 μ diam., min of meer bolvormig, soms ellipties, bruin; *epispoor* korrelagtig, 1.4 μ dik.

In vrugbeginsels van *Andropogon hirtus*, Niassaland, deur D. Goetze, ex Herb. botanico Berolinensi (1685, Tiepe).

Themeda Forskalei, Usambara, deur C. Holst, ex Herb. botanico Berolinensi (1684, Tiepe).

UROCYSTIS, Rabenh.

Rabenh. in Klotzsch. Herb. Myc. ed. II, No. 393 (1856).

Sacc. Syl. Fung. VII., p.515 (1888).

Spoormassas vorm donkergekleurde strepies in die blare en blaarskedes maar ook in die stammetjies en blomstele van die voedsterplant, bedek deur die opperhuid wat later skeur en die swart stofagtige spoormassas blootstel. *Spore* vorm permanente *spoorbolle* wat bestaan uit een of meer fertiele en gekleurde *spoorselle* met 'n dikke epispoor en is omring deur kleurlose *skorsselle* met dun mure.

Urocystis Tritici, Koern.

Koern. Hedwigia XVI., p.33 (1877).

Spoormassas vorm in lang swart strepies onder die opperhuid van die blare, blaarskedes, blomstele en stammetjies van koringplante. *Spoorbolle* 27.0—45.0 x 23.4 x 36.0 μ , min of meer bolvormig, swart. *Spoorselle* 1—3, soms 5 in getal, 9.6—

-8.0 x 12.6—18.0 μ , min of meer bolvormig of hoekig saamgedruk, bruin, oppervlakte glad; *skorsselle* bolvormig of plat, kleurloos of liggekleur.

Op *Triticum vulgare*, Caledon (2208); Philadelphia, K.P. (234); Stellenbosch, deur skrywer 141 (2402). Ook bekend van Moorreesburg, Malmesbury, Piketberg en Marico, Tvl. Op *Triticum dicoccum*, Stellenbosch deur skrywer 300 (2403). Op *Triticum durum*, Stellenbosch deur skrywer 302 (2404). Op *Triticum turgidum*, Stellenbosch, deur skrywer 301 (2405).

Hierdie swam is die oorsaak van tulpbrand by koringplante.

TUBERCINIA, Fr.

Fries Syst. Myc. III., p.430 (1829).

Sacc. Syl. Fung. VII., p.507 (1888).

Spoormassas vorm onder die opperhuid van die blare en blaarsteeltjies van die voedsterplant, later skeur die oppervlakte en word die swart, stofagtige spoormassas blootgestel. *Spore* vorm permanente spoorbolle wat saamgestel is uit 'n aantal spoor-selle van dieselfde kleur.

In Junie 1923 is hierdie geslag deur Dr. P. A. van der Byl vir die eerste maal in Suid-Afrika op *Eriospermum pubescens** aangetref.

Tubercinia Eriospermi, Syd.

(Illus. 6.)

Sydow, Annales Mycologici XXII., p.237 (1924).

Spoormassas vorm in ronde tot elliptiese, blaas- of puisvormige geswelle 1—7 mm., eers bedek deur die opperhuid van die voedsterplant wat later skeur en 'n stofagtige massa blootstel. *Spoorbolle* 15.8—23.0 μ diam., min of meer bolvormig, dikwels onreëlmatig, swart, bestaan uit 'n onbepaalde aantal spoor-selle. *Spoorselle* 3—5 in getal, 9.9—13.5 μ in diam., bolvormig, donkerbruin, oppervlakte glad, meestal geleë om 'n sentrale spoorsel 5.9 x 9.5 μ diam.

*Toe hierdie swam beskryf was, was daar nog geen sekerheid oor die benaming van die voedsterplant wat toe as *Eriospermum latifolium* beskou was. Dis nou egter vasgestel as *Eriospermum pubescens*.

Op blare en blaarsteeltjie van *Eriospermum pubescens*, Stellenbosch (1142, Tiepe); *Eriospermum*-soort deur skrywer 261.

TOLYPOSPORIUM, Wor.

Wor. in Schroet. Pilzfl. Schles., p.276 (1882).

Sacc. Syl. Fung. VII., p.501 (1888).

Spoormassas vorm 'n kompakte en korrelagtige massa in verskillende dele van die voedsterplant, meestal in die bloeiwyse en veral in die vrugbeginsel. *Spoorbolle* donkergekleur en bestaan uit spoorselle wat permanent aanmekaar vas is, *skorsselle* afwesig. *Spoorselle* hoekig of min of meer bolvormig, gekleur; *epispoor* glad of fyn bevrat.

Tolyposporium chloridis, P. Henn.

P. Henn. Pilz. Ostaf., p.49.

Sacc. Syl. Fung. XIV., p.426 (1899).

Spoormassas in die vrugbeginsel van die voedsterplant, kompakte, swartagtig, met 'n korrelagtige en puisvormige voorkome. *Spoorbolle* permanent, min of meer bolvormig, variëer in grootte, bestaan uit 3—5 spoorselle, donkerbruin tot swart. *Spoorselle* 5.4—10.8 μ diam., hoekig, bruin; *epispoor* glad.

In vrugbeginsels van *Chloris gayana* (Rhodes-gras), Mid-Illovo, Natal (386); Natal (252).

Ook bekend op *Chloris abyssinica*, tropies Afrika (Volkens).

GESLAGTE UITGESLUIT.

Graphiola, Poit.

Hierdie geslag word nou algemeen van die brandswamme uitgesluit, hoewel sy sistematiese posisie nog nie duidelik aangetoon is nie. Die ondersoekings van Ed. Fischer* skyn egter

**Beitrage der Gattung Graphiola, Bot. Zeit. 1883; en Zur Kenntniss von Graphiola und Farysia. Ann. Myc. XVIII., p.193 (1920).*

aan te toon dat *Graphiola* tog wel as 'n aansluitingsgroep tot die *Ustilaginales* beskou kan word.

Cerebella, Ces.

Die geslag *Cerebella* wat in Suid-Afrika op *Andropogon nardus* (1489), *Andropogon filipendulus* (66) voorkom, was vroeër as 'n brandswam bekend, maar is later deur Saccardo† na die *Hyphomycetes* verplaas.

Die soorte van hierdie geslag kan maklik met brandswamme verwar word, aangesien hul spore veral op dié van *Tolyposporium*-soorte lyk. P. Henning het 'n soort wat op verboude Sorghum-soorte voorkom as *Tolyposporium Volkensii*‡ beskrywe. Daar het egter oor die egtheid van die geslag twyfel bestaan, aangesien 'n versameling van dieselfde kollektant op Kew na *Cerebella Andropogonis*, Ces. verwys was.

Mason* het die geleentheid gekry om die materiaal van Kew met Henning se tiepe te vergelyk en het vasgestel dat hulle morfologies dieselfde is. Verder beskou hy die twee versamelinge identies te wees met 'n versameling van McDonald uit Kenya wat by Kew opgeteken is as *Cerebella Sorghi-vulgaris*, Subran.

Mason beskou *Tolyposporium Volkensii*, P. Henn., as 'n *Cerebella*-soort, maar wag vir die soort benaming op die uitslag van kultuurproewe waar McDonald mee besig is.

Hoewel ek nie in die geleentheid was om die swamsoort op *Andropogon filipendulus* (1489) en *A. nardus* (66) met voorgaande soorte te vergelyk nie, is ek van mening dat hierdie soort aan die geslag *Cerebella* behoort.

NOTA.—Die volgende soorte wat van Suid-Afrika aangeteken is, was nie tot my beskikking nie. Ek gee egter, sover my bekend, hul name, voedsterplant, en die plek waar hul gekry was.

†Saccardo, *Syl. Fung. IV.*, p.761 (1886).

‡P. Henn. in Engler, *Die Pflanzenwelt Ost-Afrikas und der Nachbargebiete*, pp.48—49 (1895).

*Mason, E.W., in *Transact. of the Brit. Myc. Soc.*, Vol. XI., Pts. III & IV., Dec., 1926.

Cintractia

*caricicola, P. Henn. Sacc. Syl. Fung. XIV., p.421 (1899).

Carex spathea. Tvl. (Schlechter).

piluliformis (Berk.) P. Henn. Hedwigia. 1898, p.293.

Sorosporium

africanum, Syd. Ann. Mycol. VII., p.244 (1909).

Panicum trichopodis. Portugees Oos-Afr. (van der Byl).

maranguensis, P. Henn. Pilz. Ost. Afr., p.49.

Andropogon lepida. trop. Afrika (Volkens).

tembuti, P. Henn. & Evans, in P. Henn. Engl. Bot. Jahr. XLI., p.270 (1908).

Andropogon cymbosus ?

Wildemanianum, P. Henn. Sacc. Syl. Fung. XXI., p.513.

Andropogon sp. Kwango, Kongo.

Cymbogon-soort. Tvl. (van der Byl).

Tilletia

Aynesii,

Panicum-soorte. Tvl. (van der Byl).

Tolyposporium

Anthisteriae, Cobb. Agri. Gaz. N.S.W., p.1006 (1892).

Anthisteria-soort. Sentraal-Afrika (Schweinf.)

penicillaria, Bref. Untersuch. XII., p.154.

Pennisetum typhoideum. Portugees Oos-Afr. (van der Byl).

setariicolum, P. & H. Sydow. Ann. Mycol. X., p.77 (1912).

Setaria aurea.

Ustilago

Anthephorae, H. & P. Sydow. Ann. Mycol. XII., p.197 (1914).

Anthephora pubescentis, Groosfontein (Engler).

capensis, Riess. Sitzb. phys. med. Erlang. 1875.

Juncus capensis & J.lomatophylli. Kaap.

Crameri, Koern. in Fuch. Sym. Myc. II., p.11 (1873).

Setaria italica. Tvl. (van der Byl).

Danthonia, Kalch. Grev. XI., p.18.

Danthonia papposa, Chumiberg, Lovedale (Rev. Buchanan).

* *Waarskynlik sinoniem met Farysia olivacea (D.C.) Syd.*

Elyonuri, P. Henn. & Evans. Engl. Bot. Jahr. XLI., p.270 (1908).

Elyonurus argentus. Pretoria (van der Byl).

Fingerhuthiae,

Fingerhuthia-soort. Transvaal (van der Byl).

Penniseti, Rabenh. Hedwigia, p.18 (1871).

Pennisetum-soort.

Schlechteri, P. Henn. Hedwigia, p.325 (1895).

Sporobolus-soort. Transvaal (Schlechter).

Sladeni,

Ehrharta-soort.

Stuhlmanni, P. Henn.

Andropogon-soort. Sentraal-Afrika.

Welwitschii, Bres. Sacc. Syl. Fung. XIV., p.411 (1899).

Welwitschia mirabilis. Mossamedes (Moller).

Lys van Voedsterplante:

Andropogon hirtus

Sorosporium Holstii, P. Henn.

Andropogon Sorghum

Cintractia Sorghi-vulgaris (Tul.) Clinton.

Andropogon-soorte.

Ustilago Ischaemi, Fck.

Avena sativa

Ustilago Avenae (Pers.) Jens.

Bidens pilosa

Entyloma bidentis, P. Henn.

Bromus unioloides

Ustilago bromivora (Tul.) F. v. Wald.

Carex ethiopica

Farysia olivacea (D.C.) Syd.

Carex phacota

Farysia olivacea (D.C.) Syd.

Chloris abyssinica

Tolyposporium chloridis, P. Henn.

Chloris gayana

Tolyposporium chloridis, P. Henn.

- Cynodon dactylon*
Ustilago Dregeana, Tul.
 Cyperus-soort.
Cintractia togoensis, P. Henn.
Dahlia variabilis
Entyloma Dahliae, Syd.
 Dahlia-soort.
Entyloma Dahliae, Syd.
Eriospermum pubescens
Tubercinia Eriospermi, Syd.
 Eriospermum-soort.
Tubercinia Eriospermi, Syd.
Eucomis punctata
Ustilago Peglerae, Bubak & Sydow.
Hordeum vulgare
Ustilago Jensenii, Rostr.
Ustilago nuda (Jens.), Kell. & Sw.
Ornithogalum lacteum
Ustilago Peglerae, Bubak & Sydow.
Panicum helopodis var. *glabrescentis*
Ustilago pretoriensis, Evans.
Panicum maximum
Ustilago heterospora, P. Henn.
Panicum spicatum
Ustilago heterospora, P. Henn.
 Panicum-soort.
Ustilago Panici-miliacei (Pers.) Takah.
Physalis minima
Entyloma physalidis (K. & Cke.) Wint.
Physalis peruviana
Entyloma physalidis (K. & Cke.) Wint.
 Physalis-soort.
Entyloma physalidis (K. & Cke.) Wint.
 Rhyncospora-soort.
Cintractia leucoderma (Berk), P. Henn.
Saccharum officinarum
Ustilago Sacchari, Rabenh.
 Scilla-soort.
Ustilago Vaillantii, Tul.
Scilla Kraussia
Ustilago Vaillantii, Tul.

Setaria-soort.

Ustilago Evansii, P. Henn.

Sorghum halepense

Sorosporium Reilianum (Kuehn), McAlpine.

Stenotaphrum glabrum

Ustilago affinis, Ell. & Ev.

Themeda Forskalei

Sorosporium Holstii, P. Henn.

Triticum dicoccum

Urocystis Tritici, Koern.

Triticum durum

Urocystis Tritici, Koern.

Triticum turgidum

Urocystis Tritici, Koern.

Triticum vulgare

Tilletia laevis, Kuehn.

Tilletia Tritici (Bjerk.) Wint.

Urocystis Tritici, Koern.

Ustilago Tritici (Pers.) Rostr.

Withania somnifera

Entyloma physalidis (K. & Cke.) Wint.

Zea Mays

Sorosporium Reilianum (Kuehn.) McAlpine.

Ustilago Zeae (Beckm.) Unger.

ENGLISH SUMMARY.

The article deals with the South African Ustilaginales or Smuts and descriptions are given of the undermentioned genera and species.

Entyloma, de Bary.

E. bidentis, P. Henn.

E. Dahliae, Syd.

E. physalidis (K. & Cke.) Wint.

Farysia, Racib.

F. olivacea (D.C.) Syd.

Tilletia, Tul.

- T.laevis, Kuehn.
T.Tritici (Bjerk.) Wint.

Ustilago (Pers.) Roussel.

- U.affinis, Ellis & Ev.
U.Avenae (Pers.) Jens.
U.bromivora (Tul.) F. v. Wald.
U.Dregeana, Tul.
U.Evansii, P. Henn.
U.heterospora, P. Henn. & Evans.
U.Ischaemi, Fck.
U.Jensenii, Rostr.
U.nuda (Jens.) Kell. & Sw.
U.pretoriensis, Evans.
U.Peglerae, Bubak & Syd.
U.Sacchari, Rabenh.
U.Tritici (Pers.) Rostr.
U.Vaillantii, Tul.
U.Zeae (Beckm.) Unger.

Cintractia, Cornu.

- C.leucoderma (Berk.) P. Henn.
C.Sorghi-vulgaris (Tul.) Clinton.
C.togoensis, P. Henn.

Sorosporium, Rud.

- S.Holstii, P. Henn.
S.Panici-miliacei (Pers.) Takahashi.
S.Reilianum (Kuehn.) McAlpine.

Urocystis, Rabenh.

- U.Tritici, Koern.

Tubercinia, Fr.

- T.Eriospermi, Syd.

Tolyposporium, Wor.

- T.chloridis, P. Henn.



1. *Cintractia Sorghi-vulgaris*.



2. *Ustilago Avenae*.



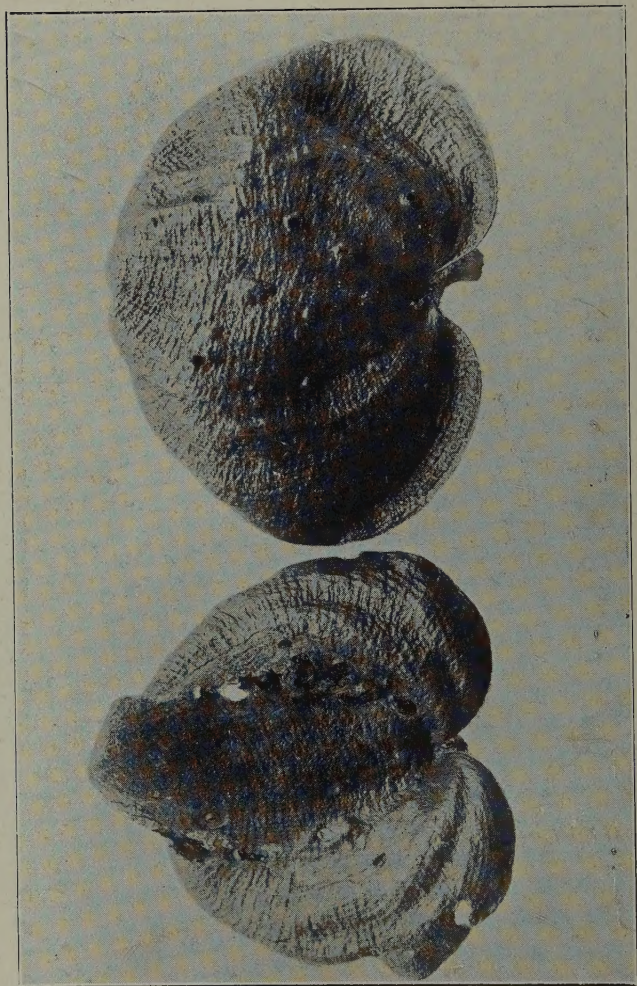
3. *Ustilago Jensenii*.



4. Ustilago nuda.



5. *Tilletia Tritici*.



6. Tubercinia Eriospermi.